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The Chemical Age

VOL LXIII 14 OCTOBER 1950 No 1631

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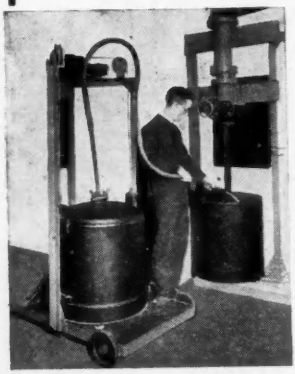

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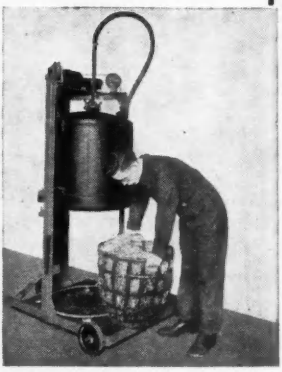

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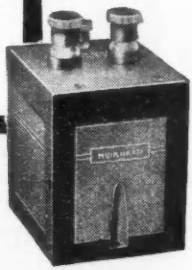

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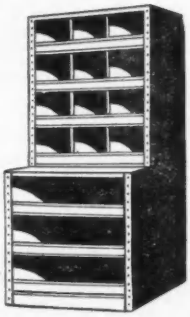

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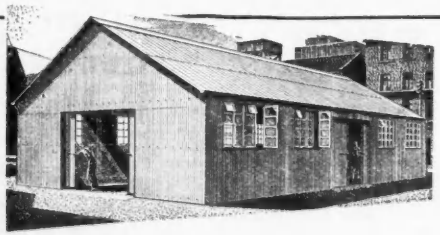

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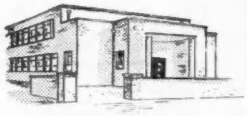

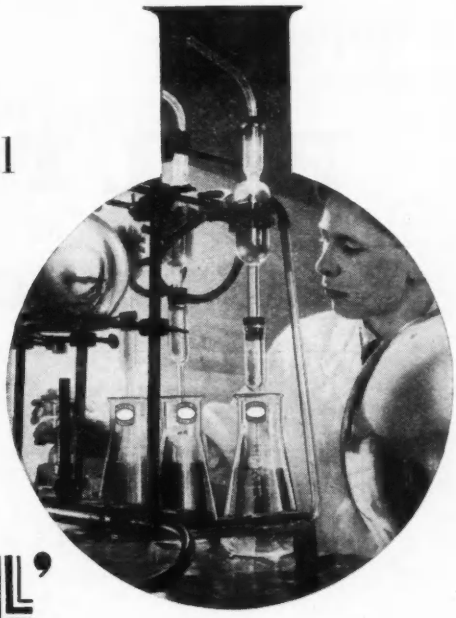

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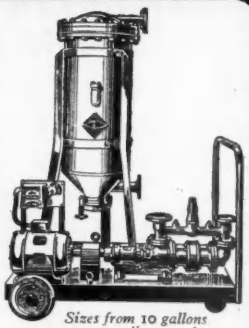

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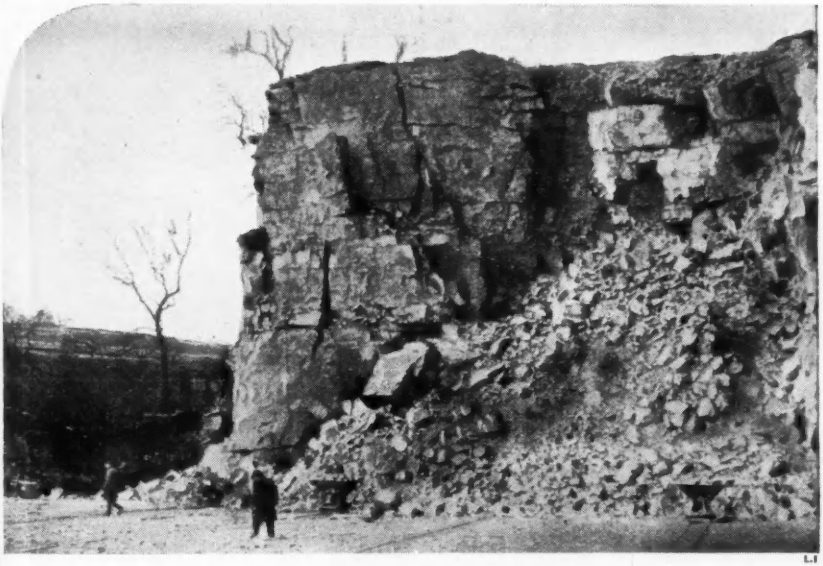

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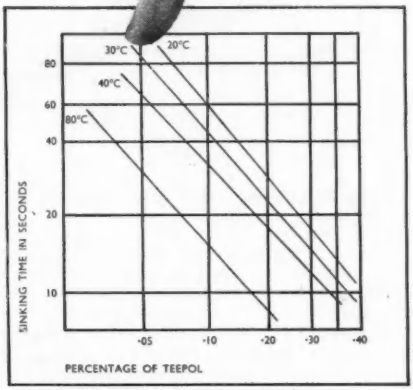
| 0·15% | 56 | 53 | 53 |
| 0·20% | 32 | 37 | 34 |
| 0·25% | 29 | 26 | 25 |
| 0·30% | 24 | 26 | 24 |

The influence of pH on the wetting properties of TEEPOL: Little variation is shown, even over the wide pH range of 4 to 10. Times are given in seconds, using the same test material as in the Draves Test.

*Technical literature on the numerous uses of TEEPOL in industry is available on request from any of the Divisional Offices shown below.*




The Draves Test shows striking proof of the wetting power of TEEPOL. In this test the wetting powers of a solution are measured by immersing in it a hank of textile fibre (in this instance, a 5 grm. hank of 40 s/2 grey Egyptian cotton yarn with a 4½ grm. sinker) and noting the time taken for it to sink. Although, as would be expected, the best wetting is obtained at the highest temperatures, the results at 20° C. are particularly noteworthy, since at a concentration of no more than 0.3% the sinking time is less than 25 seconds, indicative of high efficiency, even in the cold.

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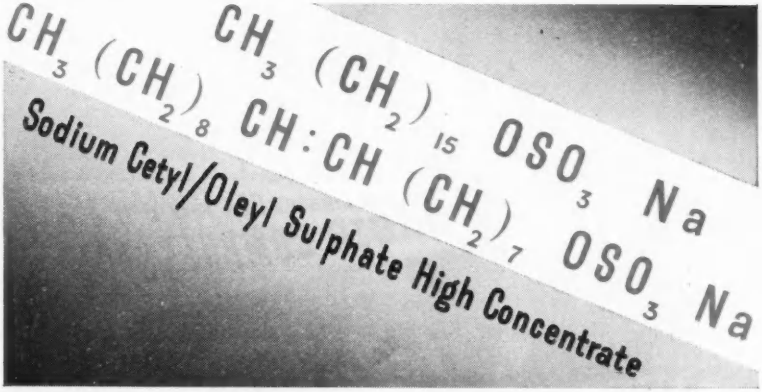


# EMPICOL C.H.C. PASTE

## Composition

| | |
|---|---|
| Sodium Cetyl/Oleyl Sulphate ... | 33/35% |
| Free Fatty Matter ... ... ... | 2.5% |
| Inorganic Salts ... ... ... | 10% |
| Water ... ... ... ... | 55% |

## Appearance

Smooth, cream-coloured paste.

## Packing

Wooden Casks.
Plastic-lined Steel Drums.

## Alkalinity

pH of 2% W/W Solution 8--9.

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★*(re : 36" Linatex Ball Mill)*
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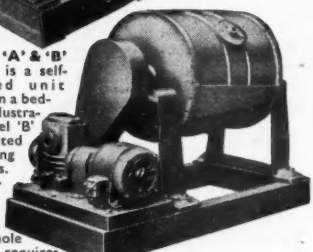

**MODELS 'A' & 'B'**
Model 'A' is a self-contained unit mounted on a bedplate (as illustration). Model 'B' is constructed for mounting on plinths. Both models feature the special quick-release handhole plug which requires no spanners.

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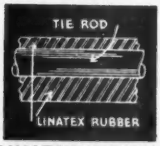


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# Chemical Age

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Volume LXIII 14 October 1950 Number 1631

## Scientific Exchanges

AS the number of their published reports multiply, the technological teams from British industry which have visited America have acquired a revived interest, comparable with that aroused when the "sharing" principle was just announced. There is a danger that many people will assume that this kind of international co-operation is a new idea, something given significant existence by the statesmen who formed the Anglo-American Council on Productivity. These recent Anglo-American interchanges are in fact no more than particular examples of a process of international discussion long fostered and supported by British science. Of that there is abundant evidence, some of the most recent examples of the international outlook of British research being the reports (for 1949) of Rothamsted and Long Ashton, two of the principal agricultural experiment stations. These two publications reveal a remarkable development of world co-operation and of very rewarding scientific "globe-trotting".

During 1949, Sir William Ogg, director of Rothamsted, visited research stations in America and Canada. Dr. Muir, head of the Pedology Department of the Soil Survey for England and Wales, spent several months in Canada and the United States studying soil survey methods used in those countries. Members of the Plant Pathology Department were seconded for urgent work in Zanzibar to deal with the "sudden death disease" of clove trees; a member of the Pedology Department gave a course of lectures in Spain and Rothampsted was represented at international conferences in America, Australia, Belgium, Holland, France, Switzerland, Denmark, and Turkey. The chemistry department continued to study problems of fertiliser use for rubber plantations in Malaya and oil palms in Nigeria and the Belgian Congo.

The Long Ashton record is equally impressive, possibly more so, allowing for the fact that Long Ashton is a considerably younger and a rather smaller centre. Professor T. Wallace, the director, spent several months in Australia and New Zealand, contacting all the principal research stations, and gave numerous lectures; in Australia he was a United Kingdom delegate at the Commonwealth Specialist Conference in Agriculture and chairman of one of its sections. These two tours occupied four months. Dr. Hubert Martin, whose 1950 appointment to an important research post in Canada was recently announced, spent several weeks in Zanzibar, also in connection

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The annual subscription to THE CHEMICAL AGE is 30s. single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

with the "sudden death disease" of cloves. Mr. R. W. Marsh, senior mycologist, exchanged duties with a Canadian mycologist and for twelve months studied the development of fungicides at more that 40 research stations in Canada and America, while Dr. Willison, the Canadian specialist on virus diseases of tree fruits, made Long Ashton his base for studying virus problem in English orchards.

It should not be supposed that all this international activity was a "one-way traffic". The Long Ashton report gives the names of 57 well-known overseas scientists who visited the station for varying periods during 1949. They were not merely from the Commonwealth or the U.S.A.—whose many emissaries included their Under-Secretary for Agriculture—but from the world. At both centres the stream of overseas visitors has been almost embarrassingly large. Sir William Ogg expresses regret that many applications for temporary post-graduate accommodation at Rothamsted have had to be refused for lack of space. Workers who have to be turned away usually go to other countries for their further training and permanent research workers are deprived of the benefit of wider associations.

This co-operation has all occurred in one year and at only two of our agricultural research stations. Earlier in this century as much contact with the rest of the world's science would not have been attained in a decade. Moreover, it has taken place when Britain herself is in the middle of an expansive technical revolution in agriculture, which is seriously under-supplied with the research and advisory scientists it needs.

These exchanges are not merely of academic scientists incapable of making the immediate contribution to practical affairs expected from the industrial technologists. In agriculture the scientist almost invariably is a technologist within the true meaning of the word. The whole of his work is directly aimed at productivity—of the world's biggest industry. We have in the past too often neglected our home agriculture and in the process limited the facilities of our research stations and the rewards of their scientists. The past deterrents, however, clearly have not prevented them from maintaining world reputations or making important contributions to the soil and crop problems of all the continents.

Rothamsted Experimental Station, *Ann. Rept.* 1949-1950, pp. 180., (5s.)

Long Ashton Research Station, *Ann. Rept.* 1949-1950. pp. 174., (12s.)

# Notes and Comments

## New Engineering Group

THE importance of Birmingham's practical contribution to the advancement of chemical engineering, which received stimulus from the establishment at Birmingham University of a very lively department of chemical engineering, is suitably recognised by the creation there of the second provincial section of the Institution of Chemical Engineers. The inauguration of the Midland branch, which is to share with the North Western branch in Manchester the distinction of being the only organised groups of chemical engineers outside London, takes place to-day (Saturday), appropriately at Birmingham University. The university has provided a focal point for many chemical interests in the Midlands, which have long recognised the desirability of a corporate voice in forwarding the neglected interests of chemical engineers in general. From the university also comes the first chairman, Professor F. H. Garner—whose stimulating influence in its department of chemical engineering has served to emphasise the practical advantages which many provincial centres forgo, having no chair of chemical engineering—the secretary (S. R. M. Ellis) and two members of the committee of nine. By the addition of the Birmingham engineers, the Institution of Chemical Engineers will be empowered to speak on behalf of approximately 2400 members of the profession. Now, with even closer integration with the chemical engineering group of the SCI, it should have ample influence to put an end to the Cinderella rôle which chemical engineering has so long occupied in regard to national allocations for training and research.

## Mineral Bonus

THE general reliability of mineral estimates in Britain, where geologists and their confreres have been active for generations, makes all the more attractive the news of mineral windfalls which flout conventional expectations. Two arresting examples, the location near Lichfield and later in the Rugeley area of coal measures sufficiently important to call for a new estimation of national coal resources, were not entirely unforeseen. One had, in fact, been suggested with remarkable accuracy many years before. Potash, on the other hand, has in this country the element of unexpectedness which compels attention from experts and all others to the recent development of some clues uncovered by an exploratory bore hole which the D'Arcy Exploration Company sank near Whitby in 1938. The quest then was for petroleum and among the results was evidence of something which, geologically, is even rarer—$K_2O$ in the form of polyhalite, apparently in large quantity at about 4500 feet.

## Expectations

A FURTHER chapter in this story, of which only a bare synopsis has been made public (THE CHEMICAL AGE, *61*, 143-145), is expected in the paper being presented in Newcastle next week (October 17) by Dr. Alexander Fleck, a director of I.C.I., Ltd., which has taken a principal part in the field and the laboratory to determine what was the significance of the original "strike". It is widely believed that Dr. Fleck is in a position to disclose some proofs much more promising than the first evidence, which related to a 15.6 per cent potash content in the deep deposits near Aislaby. I.C.I. is known to have made a number of borings in the past three years, at Aislaby and Dunsley and most recently near the beach at Whitby. Fison's, Ltd., the other leading potash user, has shared the exploratory work, at Thorpe, near Robin Hood's Bay. The existence in Yorkshire of large beds of potash-bearing materials seems fairly well established. Whether these will in fact relieve us of a fair proportion

of the heavy annual bill for overseas supplies will depend largely upon the degree of improvement made in the recovery method first proposed. That was by pumping and subsequent extraction from a brine solution.

## Up to Date Textbooks

"THERE are no good textbooks; some, however, are worse than others!" This unjust verdict of a soured seeker after truth does compel recognition that there are textbooks and textbooks. Some are as up to date as it is possible to be in an age of publishing delays, printing disputes, etc.; some, alas, are not. By judicious selection, the graduate or the works chemist is generally able to buy that book which seems to him to be the most contemporary for his particular needs. But, even then, he occasionally finds that methods quoted do not work properly, there is ambiguity, the statistical data may not agree with other works of reference, and that there are other more recent techniques which are more suitable, quicker and more accurate. In no field does this apply more than in organic analysis. Here so important are the preparation of derivatives and consequent determination of melting points, etc., that the need to use the most modern methods of analysis and the newest reagents is self evident. It is accordingly heartening that a commercial firm (Hopkins and Williams, Ltd.), has taken the enlightened course of providing a new edition of its handbook "Organic Reagents for Organic Analysis", with suitable references to recent literature so that organic analysts shall have access to the latest aids. The industrial firm, with its panel of practical chemists, possesses a considerable advantage over the academic writer of text-books. A group of chemists must collectively always be more nearly omniscient than a lone worker, especially when the group consists of chemists whose every day task is to use ultra modern methods. Their vast practical experience can scarcely fail to be of great assistance to colleagues less fortunately placed.

## Commemorating a Great Engineer

THE progress of science and invention and particularly man's adaption of energy to his requirements, have tended to invest the scientist and inventor with the distinction of creators not only of ideas but of their physical manifestations. Yet it was Sir Charles Parsons, one of Britain's greatest engineers, whose genius made possible the steam turbine, who pointed out that the scientist really only applies the various sources at his disposal. "We are all too apt," he said, "to look on scientific progress as purely utilitarian. We forget that we merely harness the mechanisms of creation. We create nothing." Memories of Sir Charles, to whom tribute was paid by Sir Harold Hartley in his presidential address "On Man's Use of Energy," at this year's British Association meeting in Birmingham, were recalled last week when Sir Robert Robinson, P.R.S., asked acceptance by the dean and chapter of Westminster Abbey of a memorial window, designed by Sir Ninian Comper. The window is one outcome of the Parsons commemoration organised by the Royal Society. Others are the annual memorial lecture and the contribution of £10,000 towards the Parsons Memorial Library, which Queen Mary opened at London House, Bloomsbury, in 1937. Sir Charles, who was the first engineer to receive the O.M., carried out many investigations leading to decisive changes, including work on large reflectors for telescopes and experiments in making diamonds. His great technical ability was sustained by a refusal to be deterred by formidable setbacks.

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### Hunterian Society Library

The Ciba Foundation for the Promotion of International Co-operation in Medical and Chemical Research in London is now providing accommodation for the library and museum of the Hunterian Society. The opening of the new premises was performed by Lord Horder at the annual party of the society held last week.

# STEEL VESTING DATE ANNOUNCED

## *Postponement for Seven Weeks*

ON February 15, 1951, all the assets of the 92 scheduled companies cited in the Iron and Steel Act, 1949, will be transferred to the Iron and Steel Corporation. News of the decision was released on October 10 by the Ministry of Supply, which observed that the Minister (Mr. G. R. Strauss), after consultation with the corporation, had decided the vesting date, which in accordance with the Act passed last year would have been January 1, 1951. Earlier, the Bill had provided that the companies, employing about 300,000, should become State property on May 1, 1950. Action by the House of Lords, however, ensured that the vesting date should not be before the General Election.

The present order—the Iron and Steel Act, 1949, (Alteration of General Date of Transfer) Order, 1950—provides that securities which are owned by listed companies or their wholly owned subsidiaries will not vest in the corporation.

**The 92 companies concerned are these :—**

Arthur Lee & Sons (Hot Rolling Mills), Ltd. ; Bairds & Scottish Steel, Ltd. ; Barrow Ironworks, Ltd. ; The Beckermet Mining Co., Ltd. ; Birchley Rolling Mills, Ltd. ; The Briton Ferry Steel Co., Ltd. ; Brown Bayley's Steel Works, Ltd. ; Brymbo Steel Works, Ltd. ; Burnell & Co., Ltd. ; The Byfield Ironstone Co., Ltd. ; The Bynea Steel Works, Ltd. ; Cargo Fleet Iron Co., Ltd. ; Colvilles, Ltd. ; Consett Iron Co., Ltd. ; The Cranford Ironstone Co., Ltd. ; The Crosby Ironstone Co., Ltd. ; Darlington & Simpson Rolling Mills, Ltd. ; Darwen and Mostyn Iron Co., Ltd. ; The District Iron and Steel Co., Ltd. ; Dixon's Ironworks, Ltd. ; Dorman, Long & Co., Ltd. ; The Elba Tinplate Co., Ltd. ; English Steel Corporation, Ltd. ; The Etna Iron & Steel Co., Ltd. ; Gjers, Mills & Co., Ltd. ; The Glamorgan Hematite Iron Ore Co., Ltd. ; The Glynhir Tin Plate Co., Ltd. ; Goldendale Iron Co., Ltd. ; The Gorse Galvanizing Co., Ltd. ; Guest, Keen & Nettlefolds (South Wales), Ltd. ; Guest, Keen Baldwins Iron & Steel Co., Ltd. ; Hadfields, Ltd. ; Hadfields Steels, Ltd. ; The Hallamshire Steel and File Co., Ltd. ; The Hodbarrow Mining Co., Ltd. ; Irchester Ironstone Co., Ltd. ; James Pain, Ltd. ; J. J. Habershon & Sons, Ltd. ; John Bagnall and Sons, Ltd. ; John Baker & Bessemer, Ltd. ; John Lysaght's Scunthorpe Works, Ltd. ; John Summers & Sons, Ltd. ; The Kettering Iron and Coal Co., Ltd. ; The Lanarkshire Steel Co., Ltd. ; The Lancashire Steel Corporation, Ltd. ; The Lilleshall Iron & Steel Co., Ltd. ; The Llanelly Steel Co. (1907), Ltd. ; The Loddington Ironstone Co., Ltd. ; London Works (Barlows), Ltd. ; The Millom & Askam Hematite Iron Co., Ltd. ; Monks, Hall & Co., Ltd. ; Naylor Benzon Mining Co., Ltd. ; The Neath Steel Sheet and Galvanizing Co., Ltd. ; The New Cransley Iron and Steel Co., Ltd. ; The Oxfordshire Ironstone Co., Ltd. ; The Park Gate Iron and Steel Co., Ltd. ; Partridge Jones & John Paton, Ltd. ; The Patent Shaft and Axletree Co., Ltd. ; Pease & Partners Lingdale Ironstone Mines, Ltd. ; Pease & Partners Normanby Iron Works, Ltd. ; Raine & Co., Ltd. ; The Renishaw Iron Co., Ltd. ; Richard Hill, Ltd. ; Richard Thomas & Baldwins, Ltd. ; Round Oak Steel Works, Ltd. ; Samuel Fox and Co., Ltd. ; The Santon Mining Co., Ltd. ; The Sheepbridge Co., Ltd. ; The Sheffield Forge and Rolling Mills Co., Ltd. ; Shelton Iron, Steel & Coal Co., Ltd. ; The Skinningrove Iron Co., Ltd. ; Smith & McLean, Ltd. ; South Durham Steel and Iron Co., Ltd. ; The Stanton Ironworks Co., Ltd. ; The Staveley Iron and Chemical Co., Ltd. ; The Steel Company of Scotland, Ltd. ; The Steel Company of Wales, Ltd. ; The Steel Company of Wales (Lysaght Works), Ltd. ; Stewarts & Lloyds, Ltd. ; Taylor Bros. and Co., Ltd. ; The Templeborough Rolling Mills, Ltd. ; Thos. Firth & John Brown, Ltd. ; The Ulleoats Mining Co., Ltd. ; The United Steel Companies, Ltd. ; The Upper Forest and Worcester Steel and Tin Plate Works, Ltd. ; The Wellingboro' Iron Co., Ltd. ; The Whitehead Iron and Steel Co., Ltd. ; The Whitehead Thomas Bar and Strip Co., Ltd. ; William Beardmore & Co., Ltd. ; Wolverhampton Corrugated Iron Co., Ltd. ; The Wolverhampton Steel and Iron Company (1946), Ltd. ; W. Wesson & Co., Ltd.

**This week's conference of the Conservative Party at Blackpool passed a resolution "strongly condemning the Government's decision to nationalise the iron and steel industry, thus dislocating a vital industry and dividing the country in bitter party controversy at a time when national unity is imperative."**

# *September Output was Another Steel Record*

STEEL production in September reached the best annual rate ever recorded for that month, exceeding the 1949 September rate by over one million tons. The rate of 16.964 million tons achieved has been exceeded only once before—in March this year when the output was at a rate of 17.147 million tons a year.

The total steel output of 12.117 million tons for the first nine months of this year was also a record, being 530,000 tons more than the same period of 1949. The latter also was the highest production figure recorded. The increase so far this year is well ahead of the Government's "target" for the industry.

Pig-iron production in September was at the annual rate of 9.712 million tons compared with 9.634 million tons in the same month of last year. Details were :

Steel Ingots and Castings
(thousand tons)

| | 1950 | | 1949 | |
|---|---|---|---|---|
| | Weekly average | Annual rate | Weekly average | Annual rate |
| First half-year | 319.6 | 16.619 | 305.7 | 15,897 |
| July ... | 276.3 | 14,367 | 244.2 | 12,697 |
| August ... | 279.4 | 14,530 | 287.6 | 14,953 |
| September ... | 326.2 | 16,964 | 305.9 | 15,906 |
| | | Pig Iron | | |
| First half-year | 184.8 | 9,611 | 181.6 | 9,442 |
| July ... | 175.0 | 9,099 | 177.4 | 9,224 |
| August ... | 177.0 | 9,205 | 182.3 | 9,477 |
| September ... | 186.8 | 9,712 | 185.3 | 9,634 |

# Rising Consumption Levels

## *Basic Production also Increased in July*

INCREASED consumption of basic chemicals was noted in most items in July compared with the same month of 1949. The principal exception was the compound fertilisers group. Production was also generally higher, examples being (in thousands of tons): sulphuric acid 148.1 (132.8); superphosphate 16.5 (14.6); and compound fertilisers 118.1 (113.9). Stocks were on the whole slightly reduced, though there were increases in pyrites 74.1 (69.7); and spent oxide 187.1 (171.0).

Non-ferrous metals were again marked by an increase in production of lead (in thousands of tons) 5.48 as against 1.62 in July last year. Although consumption was higher, stocks of this metal rose from 54.7 in 1949 to 74.0 this year. Stocks of copper and zinc were further reduced.

There was a small rise in the estimated numbers employed in chemicals and allied trades the total for July this year being (in thousands) 446.6 as against 435.1 in the same month of 1949. Main increases were in the coke ovens, chemicals and dyes, explosives, etc., and oils, greases, glues, etc. Distribution of workers according to the *Monthly Digest of Statistics*, No. 57, was: coke ovens, chemicals and dyes, explosives, etc., 257.7 (190.3 men, 67.4 women); paint and varnish 38.8 (27.6 men, 11.2 women); oils, greases, glues, etc., 66.9 (54.1 men, 12.8 women); pharmaceuticals, toilet preparations, etc., 83.2 (43.2 men, 40.0 women).

| | July, 1950 Thousand Tons | | | July, 1949 Thousand Tons | | |
|---|---|---|---|---|---|---|
| | Production | Consumption | Stocks | Production | Consumption | Stocks |
| Sulphuric acid | 148.1 | 158.0* | — | 132.8 | 132.0* | — |
| Sulphur | — | 31.9 | 82.4 | — | 26.1 | 95.4 |
| Pyrites | — | 15.5 | 74.1 | — | 16.0 | 69.7 |
| Spent oxide | — | 15.3 | 187.1 | — | 15.5 | 171.0 |
| Molasses (cane and beat) | 10.7 | 50.7† | 185.7 | 9.8 | 33.2† | 260.2 |
| Industrial alcohol (mil. bulk gal.) | 3.35 | 3.18 | 0.73 | 2.28 | 2.50 | 4.4 |
| Ammonia | — | 6.92‡ | 10.67 | — | 6.53 | 6.15 |
| Superphosphate | 16.5 | 12.4 | — | 14.6 | 10.6 | — |
| Compound fertilisers | 118.1 | 93.2 | — | 113.9 | 127.9 | — |
| Liming materials | — | 419.8 | — | — | 377.1 | — |
| Nitrogen content of nitrogenous fertilisers | 21.81 | 26.59 | — | 21.39 | 17.42 | — |
| Phosphate rock | — | 79.5 | 331.5 | — | 73.3 | 219.5 |
| Virgin aluminium | 2.24 | 13.5 | — | 2.52 | 11.2 | — |
| Virgin copper | — | 28.1 | 126.9 | — | 25.2 | 142.1 |
| Virgin zinc | 5.41 | 19.1 | 58.2 | 4.73 | 12.5 | 81.7 |
| Refined lead | 5.48 | 12.4 | 74.0 | 1.62 | 10.8 | 54.7 |
| Tin | 2.15* | 5.08 | — | 2.78* | 1.76 | 21.8 |
| Zinc concentrates | — | 11.9 | 68.0 | — | 10.8 | 40.8 |
| Magnesium | 0.49 | 0.45 | — | 0.42 | 0.38 | — |
| Pig iron | 175.0 | 124.0 | 551.0 | 177.0 | 113.0 | 436.0 |
| Steel ingots and castings (including alloys) | 276.0 | — | 1,152.0 | 244.0 | — | 1,238.0 |
| Rubber: Reclaimed | 0.47‡ | 0.48‡ | 2.49 | 0.32‡ | 0.34‡ | 2.94 |
| Natural (including latex) | — | 3.77‡ | 38.1 | — | 3.05‡ | 38.4 |
| Synthetic | — | 0.04‡ | 0.90 | — | 0.04‡ | 1.69 |

* June. † Distilling only. ‡ Average of five weeks.

## Philippine Fertiliser Plant

THE Westinghouse Electric group has been awarded a contract by the Philippine Government amounting to $4.6 million for the construction of a chemical fertiliser works and a hydro-electric power station. The fertiliser plant, which is to be located in Mindanao, is to have a capacity of 50,000 tons of ammonium sulphate per annum. The Westinghouse organisation has estimated that the plant will save the Philippines about U.S. $4 million per annum in foreign exchange in connection with fertilisers for the production of rice and sugar.

## Rising World Tin Totals

THE total production of tin from the world's mines, excluding those of the U.S.S.R. in 1949—161,700 long tons—showed a 6 per cent increase over the previous year. Asiatic countries accounted for 60 per cent of this total, South America 22 per cent and Africa 15 per cent, the remaining 3 per cent being produced by miscellaneous other sources. World smelter production of tin, at 168,700 long tons, increased by 7 per cent, the principal producers being Malaya (62.637 tons), U.S.A. (35.834 tons), the U.K. (28.384 tons) and the Netherlands (19,487 tons).

## STAINLESS STEEL COSTS

### *Economies from the Sheffield Process*

DEVELOPMENTS which may reduce the cost of stainless steel manufacture by as much as £2 per ton have been pioneered by a Sheffield firm with the help of the British Iron and Steel Research Association. By the substitution of a single addition of the alloy ferro-silicon-chrome for separate additions of ferro silicon and low carbon ferro-chrome during the later stages of the manufacturing process, substantial economies are effected in the use of expensive imported alloys. At the same time the valuable chromium content of the scrap stainless steel used as a raw material is more fully recovered, to the extent of between 91 and 93 per cent against 88 per cent before.

By using ferro-silicon-chrome the steelmaker performs two operations at once. The silicon in the alloy reduces the chromium which has passed from the scrap to the slag on the metal, while the chromium in the alloy also passes into the metal and compensates for the proportion that cannot be reduced. Previously ferro-silicon and expensive low carbon ferro-chrome (mainly imported from Canada and Scandinavia) had to be added in separate stages of the process. As ferro-silicon-chrome is an intermediate stage in the manufacture of ferro-chrome its price is considerably less.

The development, pioneered in Sheffield, of the oxygen lance method of making stainless steel in electric furnaces has made these further economies possible. Only during the last three years has it become possible to use stainless steel scrap as the main raw material in stainless steel manufacture. Some 30,000 to 40,000 tons of such scrap arises in Sheffield alone in a normal year. The high temperatures that oxygen "lancing" generates in the furnaces, up to 2000° C. against the 1650° C. previously, permits its profitable re-use.

## NEW ENGINEERING CENTRE

### *London H.Q. for Exports*

A CENTRAL home in London for the combined engineering associations, similar to the successful engineering Centre, Glasgow, has been in prospect for some time.

Early this year the Scottish Centre was asked by the British Engineers' Association to consider the formation of a headquarters to provide it with office accommodation, meeting halls, committee rooms and the facilities necessary for the effective working of the association and its allied organisations in the South. About 20,000 sq. ft. of display space is thought to be required for permanent exhibits, and for facilities for visiting engineers.

The project, outlined in the current issue of the "Engineering Centre Quarterly Bulletin," aims at providing for engineering trade associations, firms and visitors a focal point at which the primary considerations would be to serve the export markets of the world. Several buildings are now being considered. It is indicated, however, that much will depend upon close study of the possibilities of inflation and the effects of the re-armament programme on the engineering industry.

Reports on the Canadian International Trade Fair, Toronto, have also been received by the Engineering Centre, Glasgow, which undertook the organisation and management of a joint display of Scottish engineering products.

The most difficult problem in the Canadian market which this reveals, is that of obtaining entirely suitable agents. The expansion of British trade is straining the capacity of the firms who have good technicians, and until this is solved by emigration from U.K., the answer seems to lie in either group technical representatives assisting present agents or the formation of group selling companies staffed at the top from this country.

## Continuous Steel Casting in U.S.A.

AN outstanding departure from ordinary technique in steel casting in the U.S.A. may follow the formation of Continuous Metalcast Corporation, in which Allegheny Ludlum and other large steel companies are participating to employ Mr. Irving Rossi's patented process for continuous metal casting. Information supplied to New York Stock Exchange, indicates that the process has been used commercially to produce brass and, to a limited extent, some types of copper. Allegheny Ludlum and others concerned—including the American Metal Company and Scovill Manufacturing—will develop the steel casting possibilities in U.S.A. and Canada.

### German Steel Plant for Egypt

A delegation, headed by Maher Bey, Under-Secretary of the Egyptian Board of Trade is now placing contracts in Germany for the construction of a steel plant in Egypt.

## WELDED PRESSURE VESSELS

### *Code Presented in London*

THE usefulness of the work of specialist panels which has produced a provisional British Standard Code (No. 1500: 1949) for fusion-welded pressure vessels and the need for similar standardisation in kindred departments were made apparent at the meeting in London on Tuesday, called by the Institution of Chemical Engineers, at which the code was explained and discussed. The chairman, Mr. J. R. Reavell, said that the code owed its origin to a proposal by the British Chemical Plant Manufacturers' Association to the British Standards Institution in 1939. Its recommendations had now been applied for a year by chemical engineers.

Among the points raised in the course of full discussion at this week's meeting was the recommendation by Mr. J. W. Strawson (Shell Refining and Marketing Co., Ltd.) that any designs resulting from the code should be as economical as present knowledge and the price of materials permitted. The code closely resembled in some respects the existing standards for U.K. and U.S. petroleum equipment. A recommendation, by Mr. F. Peel (W. J. Fraser & Co., Ltd.), proposed the creation of a separate code which would include heat transfer formulae for the working chemical engineer and corrosion data relating to constructional materials.

Mr. Reavell expressed the thanks due to I.C.I., Ltd., whose chemical and mechanical engineers carried out much of the experimental work on which the current proposals are based. Copies of the finalised code were not available at the meeting, the printers' dispute having postponed their production.

## New Laboratory Training Syllabus

THE curriculum for the new Intermediate Examination of laboratory technicians by the City and Guilds of London Institute, which has replaced the Institute of Physics Certificate (THE CHEMICAL AGE, *63*, 220) is now in operation (1950-51 session).

The new scheme of study is divided into three sections: (1) Science and drawing; (2) General laboratory techniques and organisation, including workshop practice; (3) Specialised laboratory techniques. In sections 1 and 2 the syllabuses are common for all candidates but from section 3 a choice of one from ten specialised techniques is allowed. This selected group is intended to be introduced gradually in the second year of study, together with the relevant auxiliary science and drawing.

## REVISED BRITISH STANDARDS

### *Industrial and Test Equipment*

THE new issue of the British Standard for steel balls for Brinell hardness testing (B.S. 240, Pt. 2: 1950) is a revision of the standard published in November, 1929. That specified the hardness of balls used in carrying out Brinell tests, and having diameters of 10, 5, 2 and 1 mm. It required that the standard method of determining this hardness shall be by a diamond pyramid hardness test, but specified a reciprocal pressure test for use where a diamond hardness testing machine is not available. It set out the hardness numbers determined by this alternative method.

The revision largely affects the hardness numbers set out in the tables dealing with the two different methods specified. The new numbers have been calculated from a more accurate formula and a number of errors and inconsistencies discovered in the original have been corrected.

Copies of the revised publication may be obtained from the British Standards Institution.

**Perforated Plate**

Also published by the Institution is the British Standard for Industrial Perforated Plates (B.S. 1669: 1950). This replaces part of B.S.481 (woven wire and perforated plate sieves and screens for industrial purposes) which was issued in 1933. The new standard results for the formation in 1947 of a specialist committee, which at once recognised that the actual size of any screened material is a function of many factors besides size of apertures in the screens used for its commercial production, and that there need be no close adherence to the ranges covered by test sieves which are used solely to determine the exact size or size distribution of materials.

B.S. 1669 has been designed to cover industrial perforated plate having round and square apertures with the sizes and arrangements which are most commonly used, and tolerances on aperture size and pitch of apertures have been introduced.

No attempt has been made to standardise other shapes of aperture such as slots, but the bulk of industrial requirements is covered.

The standard, in addition, contains three tables giving aperture sizes and three pitch arrangements for industrial perforated plate with apertures from $\frac{1}{8}$ in. to 3 in.

# GOOD REPORTS OF U.S. ACID PROCESS

## *Simplified Principles of New Contact Plant*

PROMISING reports have been made on the unconventional contact sulphuric acid process recently applied on a full-scale operational scale at the Hamilton, Ohio, plant of the American Cyanamid Co.

Preliminary reports (THE CHEMICAL AGE, *63*, 387), suggested that, by the elimination of seven major items of equipment, the new process developed by the Chemical Construction Corporation was more economical and much simpler than the conventional contact process.

Further particulars of the new method, which differs in nearly every major step from other contact plants, were given in *The Chemical Engineering News* (*57*, 181).

This indicates that sulphur melting, filtering and burning are conventional, as well as the partial cooling of the $SO_2$ in a waste heat boiler, but there is no drying of the combustion air and the burner is operated at nearly 50 per cent higher $SO_2$ content of the output gas than is normal.

Conversion of $SO_2$ to $SO_3$ takes place in a new "quench type" converter which lacks the usual heat exchangers. It accomplishes conversion by means of a vanadium catalyst in four stages, with cooling between stages by the direct injection of air into the gas stream.

From the converter the $SO_3$ gas mixture passes through a two-stage absorber similar in appearance to a Chemico drum type concentrator. In the first or high strength stage the gas bubbles under the surface of acid from a dip tube. In the second stage it passes through a weak acid spray.

The absorber also acts as a cooler and eliminates the large amount of cooling surface and the large quantity of cooling water ordinarily needed in a contact plant. Only a small amount of cooling water is needed for the product acid which leaves the first absorber stage, and this water is later used for absorber acid makeup.

In the last step the large amount of acid mist created in the absorber is knocked out of the exit gases with a Pease-Anthony venturi scrubber. The gases, steam and mist pass through the throat of a venturi into which weak recirculated acid is injected. The venturi discharges into a small cyclone which catches and returns the liquid to the recirculating tank, venting steam, excess air, nitrogen and a trace of $SO_2$ to the atmosphere.

Rated at 50 tons per day on a 100 per cent $H_2SO_4$ basis, the unit has easily reached 120 per cent capacity. Currently the plant is producing 60° Be. acid directly—unusual in a contact plant, but it can readily be switched to produce any strength from 60° Be. to 93-95 per cent by a simple operating adjustment.

Oleum could be produced by adding oleum towers ahead of the absorbers, but some of the advantages of the new process would be lost in so doing and it seems probable that the main field for the process will be for 95 per cent or weaker acid.

## Energy From Underground

THE first successful use, to operate a turbine, of gases generated by underground combustion has been made at the U.S. Bureau of Mines gasification project at Gorgas, Alabama.

Dr. W. C. Schroeder, chief of the Bureau's Office of Synthetic Liquid Fuels, says the 500-h.p. gas turbine, which pumps air to the burning seam 150 ft. below, was run on the exhaust gases from the burning coal. The hot gases enter the turbine at 1200° Fahrenheit, expand and cause the turbine to spin at 20,000 r.p.m.

This development is distinct from the principal objective, the production underground of synthetic gas for direct combustion and possible conversion into liquid fuel.

## Atomic Network in the North

ABOUT 25,000 people will be employed in a network of atomic research and production centres to be built up in the North of England. Risley, near Warrington, is to become the key point of an atomic development scheme which will be outlined in a broadcast by a director of atomic research shortly. Risley will be the control centre for the extraction of uranium from ore at Springfield, the production of plutonium and radioactive gases from two atom piles at Sellafield, Cumberland, and the extraction of uranium 235 from uranium 238 at Capenhurst, Cheshire. Harwell is to be engaged wholly on research. More qualified staff are to be recruited from Manchester and Birmingham universities.

# The Cobaltic Ion

## *Reactions in Various Solutions*

A DISCUSSION of the reactions of the cobaltic ion was part of the programme at a meeting of the Chemical Society held at Burlington House on October 12. A paper "Reactions of the Cobaltic Ion with Water," read by C. E. H. Bann and A. G. White, began with a survey of simple cobaltic salt solutions.

It is well known that aqueous solutions of simple cobaltic salts rapidly decompose, the cobalt reverting to the cobaltous state and oxygen being evolved. A study of the kinetics of this rection by volumetric methods and by measurement of the rate of oxygen formation indicated that the reaction depends in a complex manner on the hydrogen ion concentration.

The variation of rate with $Co^{+++}$ concentration showed that two simultaneous reactions occurred, one second order with respect to the cobaltic ion and the other first order, the latter being predominant at low ion concentrations. From an analysis of the results it is concluded that the rate determining step is the electron transfer reaction:

$$Co^{+++} + OH^- \longrightarrow Co^{++} + OH$$

but the simplicity of this process is obscured by hydrolysis and the complex formation involving the cobaltic ion.

The second and third parts of the paper dealt with the reactions of the colbaltic ion with acids, aldehydes and alcohols. Swann and Xanthakos (*J. Amer. Chem. Soc.*, 1931, *53*, 400) observed that concentrated solution of cobaltic sulphate oxidised a wide variety of organic compounds, and these observations have been confirmed and extended. Kinetic measurements have been made of the oxidation of a few representative organic compounds in acid media and under conditions in which the above reaction with water was negligible. The oxidation of formic acid in 2-8 N $H_2SO_4$ occurs according to the stoichiometric equation:

$$2Co^{+++} + HCOOH \rightarrow Co_2 + 2Co^{++} + 2H^+$$

and the rate determining process has been shown to be the electron transfer reactions:

$$Co^{+++} + HCOOH \rightarrow Co^{++} + HCOO^{\cdot} + H^+$$
$$Co^{+++} + HCOO^- \rightarrow Co^{++} + HCOO^{\cdot}$$

Rate measurements have also been made with formaldehyde, methyl, ethyl and n-propyl alcohols and various mechanisms of the reactions are discussed.

In general, the facts would appear to be consistent with an initial reaction of the transfer of an electron from the $Co^{+++}$ ion to the organic compound with the generation of a free radical. The radical thus formed undergoes subsequent reaction with the solvent, initial reactant, cobaltic ion and other radicals formed in secondary processes.

Other papers read at the meeting included "The Kinetics of Organic Compounds" by J. Shorter and C. N. Hinshelwood and "Some Oxidation Reduction Reactions of Hydroxylamine," by P. Davis, M. G. Evans and W. C. Higginson.

## *Germanium as a Semi-Conductor*

EXPLANATION of some of the unique electrical properties of germanium was offered at Schenectady, this week, by Mr. R. N. Hall, of the (U.S.) General Electric Research Laboratory. Describing "Properties of Pure Germanium" before the National Academy of Sciences (October 10-12), Mr. Hall observed that the tetravalent element, immediately below silicon in the Periodic table—to which it is physically and chemically very similar—is a semi-conductor in the sense that only a very small fraction of the electrons present can contribute to the flow of electricity. Free electrons may exist as the result of thermal agitation or because donor impurities have added extra electrons or acceptor impurities have removed bound electrons. In the latter event, the vacant electron site is free to move and acts as a mobile positive charge, giving rise to what is called hole conduction. Germanium occupies an unusual place among semiconductors because the mobility of these free sites and electrons is greater than that observed in other semiconductors.

In the absence of impurities, germanium has a resistivity of about 75 ohm cm. at 20° C. as the result of a few parts per billion of thermally excited holes and electrons. Donor and acceptor impurities fused to geraminium act as sources of electrons and holes. Current flow between such contacts involves recombination and space-charge phenomena similar to those involved in gas discharges.

# THE ESTIMATION OF FLUORINE

## *Micro-Methods Described at Birmingham University*

METHODS for the estimation of small amounts of fluorine were described at a meeting of the Microchemistry Group of the Society of Public Analysts and Other Analytical Chemists which was held jointly with the Birmingham and Midlands Section of the Royal Institute of Chemistry, on Wednesday, September 27. The meeting, which was held in the Mason Theatre of Birmingham University, under the chairmanship of Mr. R. Belcher, took the form of a symposium having the general title of "Micro-Analytical Chemistry of Fluorine."

The first paper, by Mr. F. P. Johnson, dealt with the Analysis of Organic Fluoro-compounds. The presence of fluorine in organic compounds affects the results obtained when determining other elements, as well as presenting the microanalyst with the direct problem of the determination of fluorine itself. In consequence, some modification of the normal methods for carbon and hydrogen is necessary if the percentage of fluorine present is higher than 25-30 per cent. With a modified tube packing there is some attack of the combustion tube, but no serious difficulty arises unless a large number of fluorine compounds is being analysed. Compounds with a high fluorine content, *e.g.*, 75 per cent, are, however, extremely stable, and the combustion must be carried out at a minimum temperature of 750° C. The silica combustion tube is appreciably attacked, and a considerable amount of silicon tetrafluoride is formed. Once this happens subsequent combustions, even of non-fluorinated compounds, are affected.

Lead chromate was used to absorb the silicon tetrafluoride. This part of the packing, which fuses below 750° C., must be kept just within the furnace where the temperature is about 600° C. Such a tube has a life of about 30 to 40 combustions, but must be discarded as soon as either the tube or the packing begins to evolve silicon tetrafluoride.

### Methods of Weighing

Liquids and volatile solids are weighed in capillary tubes, while substances which are gaseous at ordinary temperatures may be weighed in capillaries by cooling in solid carbon dioxide. Non-liquefiable gases are introduced by means of a gas burette.

Highly fluorinated compounds, in which the hydrogen content is consequently very low, are difficult to analyse by the ordinary method. For such substances the method of combustion at 1200° C. in a platinum tube gives satisfactory values over the range 0-1 per cent hydrogen.

A normal Dumas combustion is satisfactory for nitrogen. The molecular weight of volatile substances is determined by the well-known method of Bratton and Lochte. A Rast method for less volatile substances has proved very successful. This method utilises difluoro-tetrachloroethane as solvent, a substance which has a very favourable value for K.

Apart from the increased difficulty in decomposing the sample, which is achieved by potassium fusion, the determination of halogens other than fluorine presents little difficulty. Fluorine itself is determined by a potassium fusion, subsequently titrating the resulting potassium fluoride with thorium nitrate, using alizarin-S indicator. The fusion is carried out at 350-400° C. in an evacuated sealed glass tube. One aliquot portion of the final solution may be used for fluorine determination, the other halogens being determined in further aliquot portions.

### Precise Titration

The thorium titration must be carefully controlled. The relationship on which it is based is non-stoichiometric, and the end point is empirical and subjective. It is doubtful if this particular titration method for fluorine, one on which much work has been published, can be further improved, and any increase in the precision of determining fluorine will probably result from the development of a radically different method.

Dr. W. T. Chambers, whose paper was entitled "The Microdetermination of Carbon and Hydrogen in Fluoro-compounds," explained that two problems arise in the combustion process: (1) the necessity for ensuring complete oxidation of the compound, a difficult process because of the remarkably high stability of the C-F linkage, and even more so of the $CF_3$ group: and (2) the production of silicon tetrafluoride. The methods devised to overcome the latter difficulty in particular, differed from that described in the previous paper.

Using a conventional tube filling of silver-copper oxide-silver, at 650-700° C., a compound such as benzotrifluoride gave a result for carbon which was low by an

amount almost exactly corresponding to one carbon atom, while subsequent combustions in the same tube were unreliable. Addition of lead dioxide at 190° C., at the end of the filling, improved the results, although the carbon value was still low. When the combustion temperature was increased to 800° C. even the most highly fluorinated compounds such as fully fluorinated dimethyl*cyclo*hexane gave satisfactory carbon figures.

The use of lead dioxide raised a further problem, due to the necessity for maintaining a proper lead dioxide-water equilibrium when dealing with compounds containing little or no hydrogen. Two methods could be employed to cope with this. The tube could be pregassed to reduce the water content of the dioxide, and then two preliminary combustions of carbon tetrafluoride carried out. Alternatively, the water content of the dioxide is not disturbed, but a known weight, several milligrams, of water might be vaporised with the sample, the hydrogen content as determined then being corrected for the added water. This investigation has enabled valuable use to be made of the hitherto objectionable properties of lead dioxide.

### Precipitation as Lead Chlorofluoride

Dr. F. R. Cropper described a "Potentiometric Titration of Fluoride with Lead." Agreeing with Mr. Johnson about the thorium titration of fluoride, Dr. Cropper said that it had been decided to investigate a completely different method, *e.g.*, the precipitation of fluoride with lead as lead chlorofluoride. The methods hitherto published have involved precipitation, filtration, washing of the precipitate with saturated lead chlorofluoride solution, and re-dissolution of the precipitate, the final determination of chloride being carried out by Volhard's method. Considerable correction is necessary, and probably adsorption of chloride ion on the precipitate is a serious cause of the inaccuracy reported by many workers.

Farkas and Uri have described a potentiometric determination of lead involving titration with sodium fluoride, with a claimed accuracy of 0.5 per cent. It was decided to investigate the possibilities of using the reverse process. The principle of the method is to add a considerable excess of chloride to the fluoride solution, titrating with lead nitrate solution in the presence of an indicator comprising a large amount of ferric chloride and a small amount of ferrous chloride. The ferric chloride is complexed reversibly by the fluoride ion, forming $FeF_6^{---}$. Towards the end point this ferrifluoride ion dissociates, liberating $Fe^{+++}$ and changing the redox potential markedly.

Up to the present the method has only been applied to the titration of sodium fluoride solutions, and its application to the decomposition products of organic fluorine compounds has not been studied. Suitable conditions for the semimicro determination, involving 40-120 mg. fluorine, which give reproducible and accurate results, have been evolved. For micro quantities, where the fluorine content is 4-16 mg., similar experiments have given moderately good results, but there is still room for considerable improvement on this scale.

Mr. R. F. Milton described a "Multiple Apparatus for the Determination of Micro Quantities of Fluorine." This distillation apparatus, which was on display, was devised for the estimation of fluorine in biological substances and foodstuffs. In such cases, in contrast to the determinations previously described, the amounts of fluorine involved are very small—down to one or two micrograms, while the accuracy required at this range is of the order of 10 per cent. Consequently the main difficulty which arises is in reducing the fluorine blank of the reagents and, in particular, the apparatus used.

The usual procedure is to destroy the sample by lime fusion in platinum, and then to separate the fluorine by distillation in glass. Glass always gives a fluorine blank of the order of micrograms in the conventional estimation, and the problem of how this may be eliminated has been achieved by reduction of the glass surface. At the same time spray is trapped efficiently. Instead of the normal 150 ml. flask, a flask of 25-30 ml. capacity is used, and with the multiple equipment shown, four distillations can be carried out simultaneously, the distillation time being 10-12 minutes.

In the subsequent titration of the fluoride with thorium nitrate, solachrome blue is preferred as an indicator to alizarin-S, and the results on qualities of 5 to 0.5 mg. fluorine had the desired accuracy of 10 per cent.

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### U.K. Aluminium Price Raised

The selling price of virgin aluminium (99.0 to 99.5 per cent) in ingot form was increased on October 9 by £8 to £120 per long ton, delivered. This is the first alteration in the U.K. price of the metal since September, 1949, when it was raised from £93 to £112 a ton as a result of devaluation. The existing addition of £2 10s. a ton for metal in notch bar form remains unaltered and there is no change in the premiums for higher purities.

# SEPARATION OF INTRACTABLE MATERIALS

## *Uses of a New Ion-Exchange Resin**

THE development of the antibiotics industry during the present decade has made the need for better chemical adsorbents increasingly apparent. These powerful new pharmaceutical materials—penicillin, streptomycin, bacitracin, etc., are commonly made by fermentation processes which involve the use of large volumes of nutrient solution. When an antibiotic is formed in the fermentation vats, it represents only a minute fraction of the tremendous mass of material present.

Furthermore, the extraneous material frequently resembles the active ingredient itself. Until recently there has been no really efficient means of extracting the tiny fraction of useful drug from the great mass of other material.

Now, however, a synthetic resin introduced by Rohm & Haas two years ago has proved valuable in many types of chemical recovery problems and is particularly useful in the isolation of several of the antibiotics.

Chemically, the new adsorbent is a carboxylic-acid, cation-type, ion exchange resin. (Amberlite IRC-50) in the form of tiny, hard, spherical beads.

### Ease of Recovery

It derives much of its power of selective adsorption from the fact that it can be treated to perform its adsorptive function at specific *p*H values. Besides this the resin offers the additional advantage of ease of recovery of the adsorbed material. This is in contrast with some of the earlier forms of ion exchange resins which sometimes held adsorbed material so tenaciously that removal on a commercially practical basis was impossible.

In the antibiotic field, Amberlite IRC-50 is stated to be an effective device for the recovery of those products which react as bases and it is employed commercially for this purpose. After adsorption, the recovered chemical is easily flushed free from the resin and the exchanger is ready for regeneration and re-use.

Such a resin obviously has many possible uses. There are numerous operations, both in the preparation of pharmaceuticals and in the manufacture of other types of products, where selective adsorption is a processing requirement.

The isolation of alkaloids is typical. Quinine, for example, is prepared by a series of extraction and crystallisation operations which are costly, complex and time-consuming. The natural chincona bark from which the quinine is obtained also contains undesirable alkaloids. The quinine must be separated from these before it can be used in medicine.

The problem is complicated by the fact that the origin of the bark is in the tropics and, for practical reasons, the isolation work should be performed there. A simplified means of effecting the separation at the place where the bark is collected would be a noteworthy contribution to the quinine producing industry.

### Quinine Separation

Amberlite IRC-50 offers a means of accomplishing such a separation of the quinine from the other extraction products. It has been suggested that portable exchange units could be set up and used where needed. Extremely simple equipment of this type could open the way for the production of quinine of remarkable purity at a considerable reduction of cost. A similar process could be developed for the recovery of other alkaloids—nicotine, cocaine, morphine and related compounds of this type.

Another interesting application for the new resin is in the separation of the basic amino acids—arginine, histidine and lysine from the neutral and acid members of the amino acid group.

The amino acids are in increasing demand both for dietary and therapeutic uses; but isolation and purification of the individual compounds have long been troublesome. An ion-exchange technique using Amberlite IRC-50 is now in pilot plant operation and may solve the problem.

Since the advent of Amberlite IRC-50 as applied to water treatment, this resin has proved more efficient and more economical in certain cases than any of the other types of resins. Amberlite IRC-50 efficiently reduces the alkalinity and solids content of hard, highly alkaline water. The activity of the resin stems from weakly acidic carboxylic groups which can be regenerated with small quantities of inexpensive acids—an economical advantage that is not shared by the strongly acidic exchangers.

* Abstract of an article in the *Rohm & Haas Reporter*, 8, 2, 20-22.

# DEVELOPING THE PAPER SACK

## *Fruits of Five Years' Study by the Fertiliser Industry*

by A. T. BROOK, D.I.C., M.Sc., A.M.I.Mech.E.

WET strength and union papers, when tested by the normal tensile test or burst test methods show up equally as well as plain Kraft in relation to their DC weight (weight in lb. of 2000 sq. ft.; Kraft for 1 cwt. fertiliser sacks is 37 DC).

*So recent is the acceptance by agricultural fertiliser industries of the 1 cwt. multi-wall paper sack, in which today some 90 per cent of granulated fertilisers are contained, that the field for innovation and improvement in the materials forming the plies, seams, closures and filling methods is still very wide. Far ranging practical research in conventional and unconventional materials and methods, upon which such advances will largely depend, has been carried out since 1945 by Fisons, Ltd., with collaboration from Medway Paper Sacks, Ltd. The fruits of that work have now been fully disclosed in a paper read before the Fertiliser Society by A. T. Brook, whose intimate concern with such investigations since 1944 enables him to indicate some possibilities of securing greater serviceability by adopting modified constructional materials and methods.*

When, however, they are subjected to shock loads, such as occur when a sack is dropped, they are relatively much weaker, and a search has been made for alternative materials which would act as waterproof and acidproof barriers and at the same time provide useful strength to the sack. The main materials tried out have been:—

Sisalkraft of various types; crepe paper; and plastic-coated paper.

Sisalkraft is made in various forms, one of which is a heavy union type employing wet-strength creped papers as the outer plies; sandwiched between them are layers of bitumen with an open-mesh sisal scrim which provides extra strength and limits the extent of stretch of the crepe.

This attracted us as a possibility for sack construction, and single-ply gusseted sacks of normal size, *i.e.*, 18 in. by 4 in. by 37 in. were made from it.

As far as the sack walls were concerned, the strength of such sacks proved at least equal to that of normal 5-ply sacks. The cost also appeared favourable, but our tests showed that further consideration would need to be given to the strength of the stitched and seams, as the sacks all failed by tearing between the stitching holes.

Sisalkraft produced a sack having the feel and performance more of a textile sack. Unfortunately, limitation of supply prevented further tests being conducted.

### Crepe Kraft

It is well known that crepe paper has much greater resistance to shock loads and to accidental tearing than ordinary plain paper. The degree of creping can be controlled at will, according to the purpose for which the paper will be used.

The type used as an outer ply for paper sacks is a special low-stretch crepe (6 per cent extensibility) which is made in the course of the normal paper-making process.

Crepe papers having much greater extensibilities (up to 20 per cent) are made as a separate converting process from plain Kraft, and for many years before the war special sacks known as Crepesacs were widely used in this country by the milling trade. They proved much stronger than sacks of plain Kraft.

### Drop Test Endurance

We have tried a number of 3 and 4 ply all-crepe sacks, in this case American made, and, although holding only about 105 lb. granular fertiliser, the comparison of drop-test figures with those of standard 5-ply 1 cwt. sacks is interesting.

The 3-ply sack, having an overall DC weight of approximately 164 lb., when subjected to test, withstood 172 drops before bursting, and the burst then was due entirely to chafing by the rope slings supporting the sack in the testing machine. The rest of the sack appeared perfectly sound, and the stitching at the maker's end, which was of 12's/4 cotton without filler cord, but with a crepe paper tape as in the Bates stitch, was entirely unaffected. Thus it was evident that the crepe paper itself reduced the load on the stitched ends, and I consider that there

* A short abstract of "Fertiliser Packaging: the Development of the Paper Sack," by A. T. Brook, D.I.C., M.Sc., A.M.I.Mech.E., presented in London on October 12 before the Fertiliser Society, which has published the paper in full.

must be a considerable future for this type of sack when the difficulties of manufacture have been overcome.

One such difficulty would be the manufacture of a satisfactory creped union paper in which the bitumen layer was perfectly sound. Again, crepe paper handles and folds quite differently from plain paper, and existing sack-making machinery may not be able to deal with it. The crepe used in the sacks had a percentage stretch of approximately 12.

As an alternative, the author considers that sacks having an outer ply of wet-strength crepe paper in place of the existing plain paper, would be a big improvement. Such an outer ply would resist accidental damage, and if this ply remains sound during handling and transport the rest of the sack cannot suffer damage.

### Plastic-Coated Papers

An alternative to the employment of creped papers would be some means of strengthening existing Kraft, and great headway has been made in recent years with the coating of paper with plastics. Various treatments have been applied using water dispersions of PVC, or PVC dissolved in organic solvents. It is understood that the performance of these papers has been rather disappointing, but meanwhile some success has been achieved both in the U.S.A. and more recently in this country in the coating of paper with polythene, which is melted on to the paper and regulated by doctor-knife treatment.

In this process, perfectly uniform polythene coatings down to .0005 in. thickness can be applied, and at the same time a useful addition to the strength of the paper is provided. Consideration of the specification of our present 5-ply sacks show that if the inner union were replaced with a coated paper, with the plastic on the inside, and a similar paper used for the outer ply, again with the plastic inside, there would be at least four paper plies fully protected both from inside and out, compared with the existing two protected plies. Such sacks should, therefore, be considerably stronger than sacks using union paper, and they would lend themselves to 4 or even 3-ply construction. The acid and water-proof qualities should be superior to sacks employing bitumen-union papers.

Reference to Table 1 shows that the permeability of polythene is a very small fraction of that of union paper. The thickness of the bitumen layer in an average union paper is .0015 in., so obviously polythene coatings of only .0005 in. thickness will have a much greater resistance to passage of water and acid vapour.

TABLE 1

| Material (Uncreased) | Permeability (P) $\times 10^3$ at 20°C. |
|---|---|
| Standard Cellophane ... ... ... | 50 |
| Regenerated Cellulose ... ... | 40—50 |
| Plasticised Cellulose Acetate... ... | 45 |
| Bitumen Union Paper (weight not known) ... ... ... ... | 13 |
| Soft Vulcanised Rubber ... ... | 5 |
| Microscopic wax-coated Cellophane... | 1.5— 4.5 |
| Plasticised Polystyrene ... ... | 3.5 |
| Plasticised PVC ... ... ... | 0.8 |
| Rubber Hydrochloride (Pliofilm) ... | 0.2 |
| Polythene (2 thou. film @ 0°C.) ... | 0.15 |

### Weather Resistance

The initial moisture content in every case was approximately 1 per cent and it is interesting to note that the fertiliser in the jute sacks indoors reached an equilibrium of 2 per cent, whereas that in the paper maintained its initial content of 1 per cent.

In the outdoor clamp the moisture content of material in the jute sacks presumably varied with the weather, but again the paper sacks maintained their initial figure.

Developments of this nature are entirely in the hands of the paper manufacturers, as the processes involved necessitate considerable expenditure in new plant and equipment.

Until recently the supply and price of polythene have been such that developments of this nature were limited, but its rapidly increasing use, with corresponding reduction in price, should make developments as just outlined more practicable.

### Setting and Moisture Content

There are very wide divergencies of opinion regarding the setting behaviour of fertilisers when filled into paper sacks as compared with jute. The whole subject of setting is very involved and a large number of factors, apart from the nature of the package, can affect the problem.

Where we have wished to carry out setting tests employing paper sacks we have usually found it most difficult to make the fertiliser set at all, yet many customers have found after storing paper sacks containing fertiliser, that they can become solid slabs.

The amount of such set in paper sacks is deceptive, particularly to those more used to jute sacks. We have found that an apparently heavy set can readily be removed by dropping the sack flat, two or three times, from a height of 3 ft. This breaks up the main set, and remaining lumps can be dealt with by judicious use of a wooden mell. If the paper is not too dry and the sack not too tightly filled,

(*continued at foot of next page*)

# Estimating Fertiliser Values

## *Analytical Chemists Propose New Methods*

THREE suggested techniques for establishing some essential values in fertiliser materials, each appearing to offer considerable advantages over existing methods, were described at a meeting of the Society of Public Analysts and Other Analytical Chemists in London last week.

Experimental evidence was submitted to show that the value of a burnt lime for agricultural purposes may be seriously under-estimated by the method prescribed under the Fertilisers and Feeding Stuffs Act. This was offered in the course of a paper, "The Evaluation of Liming Materials for Agricultural Purposes," by A. M. Smith, Ph.D., D.Sc.; A.H.-W.C., F.R.I.C.; A. Comrie, B.Sc., A.R.I.C.; and K. Simpson, B.Sc., A.R.I.C.

Calcium silicates and magnesium oxide are able to neutralise soil acids, and the latter is also important as a source of magnesium in certain soils.

### New Methods

Various methods of estimating the neutralising value have been examined and a simple technique, involving a short treatment with dilute acid and applicable to both carbonates and limes, has been found to give results in agreement with the effects produced on soil acidity in pot and field experiments.

N. H. Wilson, F.R.I.C., presenting a paper on "The Accurate Determination of Phosphoric Anhydride by means of Quinoline Phosphomolybdate," critically surveyed the present methods of determining phosphoric anhydride and outlined the requirements of a new method. Such a method should be at least as accurate as the "official" method and much quicker.

As the phosphomolybdate reaction appeared to be the most suitable, previous work on this subject was summarised, and the reaction discussed in detail.

It was shown that very accurate results could be obtained from the volumetric method by precipitating quinoline phosphomolybdate instead of the usual ammonium salt. Few substances present in fertilisers interfere except ammonium salts, which can be destroyed. A large excess of sulphuric acid also interferes.

Results by the "official" and the new method were compared and the respective standard deviations were 0.065 and 0.024 per cent of phosphoric anhydride. Full working details were given for the accurate determination of phosphoric anhydride in fertilisers.

In "The Determination of Potassium in Fertilisers by Flame Photometry," L. Brealey, B.Sc., showed that the potash content of fertilisers could be determined simply and quickly by flame photometric methods. Reproducibility was excellent and the results obtained agreed well with determinations by the official chemical method. Interference from the other constituents of fertilisers so far investigated was shown to be negligible. The instruments used were built in the laboratory and were of a very simple design.

The chief advantage of the method is its speed, which makes it particularly useful for production control.

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### DEVELOPING THE PAPER SACK

(*continued from previous page*)

it is surprising what a considerable amount of treatment of this nature a paper sack will stand. It may be useful to mention at this point that if sacks were constructed entirely of crepe paper, or even with an outer ply of this paper, they would be able to withstand such treatment more easily, to the benefit of the farmer.

Undoubtedly the most valuable feature of the standard 5-ply sack is its resistance to moisture, and this must contribute towards minimising the degree of set. We have measured changes in moisture content of fertiliser stored in outdoor clamps and in good sheds, using "B" twill jute sacks and fully waterproof paper sacks, and the following figures may be of interest.

| Type of Sack | Moisture content of fertiliser After 1 mth. % | After 2 mths. % | After 3 mths. % |
|---|---|---|---|
| 'B' twill in clamp ... ... | 2.15 | 3.05 | 2.5 |
| Paper sack in clamp ... ... | 0.94 | 0.98 | 0.95 |
| 'B' twill in shed ... ... | 2.00 | 2.00 | 2.10 |
| Paper sack in shed ... ... | 1.08 | 0.95 | 1.04 |

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### Blind Chemists

Research chemistry is among the wide range of occupations taught at St. Dunstan's, of which the 35th annual report is now published. In "Pulling their Weight," the chairman, Sir Ian Fraser, M.P., describes the continued work of this great institution.

# POLYAMIDE RESIN WATER DISPERSIONS

## *Widening the Sphere of Plastics Processes*

From A SPECIAL CORRESPONDENT

ORDINARY nylon polymers used in textile and plastics applications present the difficulty of being unsuitable for making stable water dispersions. It is necessary to produce special polyamide resins for this and considerable success has been achieved by utilising resins prepared by the condensation of dimerised vegetable oil acids with ethylene diamine.

Suspensoids made from these resins are now in use in the U.S.A. General Mills, Inc., for example, is producing polyamide resins suspensoids that are white, opaque liquids of medium viscosity with solid contents of 35-42 per cent. They are slightly acidic but remarkably stable and can be subjected to repeated freezing and thawing without coagulation. Advantages offered by such suspensoids over the hot melt or solution type polyamide resins may be summarised thus:—

1. Water dispersions of the resin enable solutions to be prepared of higher solids content at low viscosities.

2. They are easier to apply than either solvent solutions or hot melt coatings.

3. Penetration can be more accurately controlled.

4. The elimination of expensive solvents promotes economies.

5. Fire and health hazards are reduced as the dispersions are non-inflammable and of low toxicity.

6. Dispersions can be produced in many different forms for specific applications.

By modifying the nature of the raw materials or the conditions of polymerisation, it is possible to produce many different types of base resins, permitting a wide range of dispersions to be made. The suspensoids can themselves be altered by the inclusion of certain modifying resins and by special compounding after dispersion. Some dispersions are stable at low temperatures and have exceptional adhesive or bonding characteristics. Others exhibit exceptional resistance to blocking and lend themselves readily to further compounding for the manufacture of adhesives.

The polyamide suspensoids as a class are easily applied to a variety of surfaces, such as paper, cloth, wood, metal foils, plastic films, etc., to produce white films composed of discrete particles, indistinguishable to the eye. These films dry rapidly and do not block even under severe humidities and pressures; moreover, the coatings age well and show no signs of deterioration after long exposure to air.

Commercial polyamide resin suspensoids can be diluted to any desired concentration with ordinary tap water, and organic solvents may be added to the dispersions to improve gloss and adhesion of the resin to plastic films or resin surfaces. It is possible to incorporate in the suspensoid relatively large quantities of solvent in which the polyamide resin is insoluble.

Plasticisers, such as dicapryl phthalate, dibutyl phthalate, dibenzyl sebacate, dioctyl sebacate, etc., can be incorporated in the suspensoid to increase flexibility, lower the softening and heat seal temperatures, to improve tack and gloss.

### Increasing Compatability

Normally suspensoids are produced as cationic liquids and they are, therefore, only compatible with other cationic or neutral emulsions and dispersions, such as polyvinyl acetate emulsions and certain rubber latices. It is, however, possible to reverse the charge, and so obtain an anionic dispersion compatible with a wide variety of anionic emulsions, dispersions and latices.

Ease of modifying standard polyamide resin dispersions is one of the outstanding advantages of these preparations. Not only may solvents and plasticisers be added to modify properties, it is also possible to incorporate thickeners, stabilisers, pigments and dyes. Nitro-cellulose, hard waxes, paraffin wax and certain oils, such as castor oil, can be added to reduce tackiness.

The most important uses likely to be found for polyamide resin dispersions, when they become more generally available, are as adhesives and protective coatings. Cements and adhesives based on these dispersions are readily applied to paper, cloth, leather, cork, metal foils, regenerated cellulose film, wood, and certain plastics and plastics films. They have excellent heat seal properties in the lamination or bonding of papers, cloths and foils.

# New Light on DDT

## *Retention in Animal and Human Systems*

THE ingestion of some of the toxic material of DDT by men and animals has lead to considerable disquiet about the widespread use of this insecticide and, in the U.S.A., has given rise to official restrictions. These considerations will heighten the interest in current research in the Pest Infestation Laboratory (Department of Scientific and Industrial Research), of which some results have now been reported (*The Journal of the Science of Food and Agriculture*, 1, 7, 214-219). This work reflects, incidentally, the useful practical application of radioactive isotopes, in this instance the bromine analogue of DDT, $Br^{82}$, one bromine atom replacing the para-chlorine atom of DDT.

### Residues Ingested

Whole wheat grain was sprayed with this DDT analogue and subsequently fed to hens or milled and baked into bread which was fed to rats; in one experiment the bread was consumed by one of the research workers. It was clearly shown that there is a substantial retention of insecticide residues by animal tissues and organs, and there was strong indication of chemical changes occurring in the insecticide molecule both as a result of baking the milled wheat and also in animal metabolism.

The whole grain carried a residue of 40.2 p.p.m. of the radio-labelled insecticide. After conversion into flour at an 85 per cent extraction rate the concentration was 14.6 p.p.m. and that of bread made from the flour was 11.2 p.p.m. Within a few days of feeding the grain to hens, the insecticide was found to be widely distributed in their bodies, particularly in the liver, gizzard, sciatic nerve fibre, and heart tissue. The retention appeared likely to have lasted for a considerable time. Somewhat similar results were secured, after five days, with rats.

In the single human test, in which 30 grams of bread containing 200 p.p.m. at a low stage of activity were eaten, 5 per cent of the total activity was expelled in urine in the first 48 hours. This would seem a disturbingly low figure, suggesting that the human body retains a very substantial proportion of DDT-type residues when these occur in or on food. In this connection, it was suspected that, in baking, some of the DDT analogue combined with the protein of the flour.

It may be objected that this work was carried out with an analogue of DDT and not with DDT itself. But it should be borne in mind that previous work has shown that the physical, chemical, and insecticidal properties of the Br-analogue are all closely similar to those of DDT. The halogen element in the para-position is believed to provide lipoid solubility rather than toxicity, so that the same toxic factor is present in the Br-analogue.

It is not easy to dispute the conclusion reached in this unique paper, that "every possible precaution should be taken to prevent contamination of foodstuffs with DDT until more is known of its chemistry in relation to food." The results amply support the general opinion that DDT cannot be used for the protection of stored grain.

## *Thiocarbamic Acid Derivatives as Fungicides*

CONSIDERABLE development has recently taken place in the application of derivatives of thiocarbamic acid as fungicides. Much of the earlier research work was carried out in the U.S.A., but progressive investigations have more recently been made in Great Britain and the Netherlands.

Tests over a reasonably long period have shown that these derivatives are effective as dusting powder and, as liquid sprays, have good spreading, wetting and adhesive properties. In all these formulations use is made of a further principle, the synergistic action of certain tri-aryl phosphate series. The main esters used are tri-cresyl phosphate and triphenyl phosphate.

These relatively new agricultural chemicals, like most others, call for some precautions in their use, which are dealt with in a detailed short survey of the Vitospor-X series of fungicides (Vitax Technical Bulletin No. 10; Vitax Fertilisers, Ltd.).

Toxicity to men or animals, a factor of considerable importance in the relatively new formulations of this kind, is relatively low. Brief encounters with spray drift or dust are said to be harmless, although prolonged inhalation must be avoided.

The summary distinguishes as the most hazardous portion of the compound the tri-cresyl phosphate and quotes some reassuring evidence provided by the toxicology research unit of the Chemical Defence Experimental Establishment.

OVERSEAS CHEMISTRY AND INDUSTRY

# FRENCH CHEMICAL EXPANSION PLANS

## Costly Developments Recommended in Commission's Report

THE full report of the Commission de Modernisation des Industries Chimiques, dated October 1949, has only just been published, but the gist of the general conclusions had already been conveyed to some of the leaders in the industries concerned. It is a volume of 260 pages in which are condensed the findings of 300 experts, members of the various sub-committees. The editor is M. Moreau, who was assisted by M. Borocco.

It is concluded that the capital resources of private enterprise will be insufficient to finance all the developments recommended, which are estimated to cost at least Fr.175,000 million (1949 valuation), and special loans are recommended, from the Conseil National du Credit in particular.

The report comprises six main groups: General introduction dealing with fundamental questions such as research, professional training, raw materials, selling prices, finance, export trade, equipment; inorganic products—nitrogenous, fertilisers generally, sulphuric acid and products, alkalis, pigments; electrochemical and electrothermal products; organic: (*a*) general organic synthetics, (*b*) dyes, pharmaceuticals, plastics, synthetic rubber; semi-chemical products such as paints and varnishes, rubber, detergents, glass; miscellaneous, *e.g.*, carbon black, catalysts, insecticides, etc.

The following basic data and estimates for particular industries and branches are presented: Total requirements forecast for 1952 in respect of the French home market, French colonial market, and general exports; technical and economic aspects and factors; the relation of capacity to these estimated needs; raw materials, power supply, equipment, finance.

### Comparison With FBI Report

The statistical information given varies from industry to industry, being much more abundant in some than in others. Commenting on this point, J. Raimbault compares this matter of statistical wealth and poverty with a similar report by the FBI in Great Britain, in which, for any of the 17 industries or groups dealt with, it was considered sufficient to indicate the actual tonnage and value of present output and of future objectives. The statistical data on which these are based, however, do not appear to have had the same detailed study as in the French report; at all events they have not been shown (*Chim. et Industrie* 1950, *64* (3) 361-3).

It would be easy to criticise the forecasts made for 1952, which the authors of the report are careful to point out are only approximate and dependent on uncertain factors. The attainment of the anticipated levels will largely depend on the energy, skill, and vision with which the various basic and general questions are tackled. The principal of these are described in the report.

The urgent need for the utmost development of technical research is axiomatic, and the report stresses that in the U.S.A., Great Britain and Germany research expenditure constitutes at least 3 per cent of the total turnover. The qualitative and quantitative study of staff and labour requirements corresponds to the estimated forecasts of increased production; that is to say, about 350,000 in 1952 and about 50,000 above the present number. Recommendations are made in respect to educational and training facilities to provide the increased numbers in the various categories, professional and otherwise.

### Raw Materials

The raw materials side of the complex whole has been thoroughly examined with regard to power sources (coal, etc.) and numerous detailed recommendations are made and resolutions recorded for passing on to the public authorities concerned, both as to fuel sources and other raw materials, indigenous or colonial. It is expected that the modernisation plans should result in more efficient and economical production, due, among other things, to increasing unit capacity of plant; improved equipment; grouping of plants engaged in closely related products or derivatives; use of cheaper raw materials.

Dealing with the special needs of plant and equipment renewal, the report states that plant and apparatus were obviously in a bad way after the war, and owing to high taxation and other causes it has not been possible to build up a fund for obsolescence or otherwise. Even after some of the taxation—purchase tax, for example—has been reduced or removed, this financial inability still remains.

## INDIA'S PAINT INDUSTRY

### *Production and Expansion*

INDICATIVE of the recent considerable expansion of the Indian paint industry is the fact that there are now about 150 factories, mainly in Calcutta and Bombay, engaged in the production of paints, enamels and varnishes. Ten of these are leading firms and 40 are medium-class manufacturers, while the remainder are small units.

The 1938 output of standard paints, enamels and varnishes in India was 24,740 tons. Imports of finished paints in 1937-38 aggregated 6067 tons, and in addition, 10,000 tons of raw materials such as pigments, colours and mineral turpentine were also imported.

In 1949 the production of standard paints, enamels and varnishes had increased to 30,929 tons. Imports of finished paints fell to 1642 tons and raw material imports were 9669 tons.

The present installed capacity of the Indian paint industry, for standard paints and enamels, is estimated at 60,000 per year, and that for high grade paints and synthetic enamels is about 3 million gal. annually.

The Indian paint industry concentrates on the manufacture of distempers, stiff paints, ready-made paints, varnishes and bituminous compositions. The manufacture of special paints is still in its infancy.

In recent months attempts have been made to manufacture superior quality paints, synthetic enamels and varnishes. Synthetic resins and nitro-cellulose lacquers are now being produced, and the production of white barytes by the bleaching method is also being attempted.

The construction of a plant for the production of aluminium paste and powder has almost been completed. The production of titanium dioxide from ilmenite is expected from 1951. The capacity for producing zinc oxide has been increased from 5000 tons in 1945 to 7000 tons per year today. A lead oxide plant, suitable for battery manufacture, is also being set up.

### Malayan Tin Exports Record

Exports of tin from Malaya in September established a new record for 1950 with a total of 8597 tons, an increase of 1097 tons above the previous month. Main recipients were: U.S.A. 2170 tons; and the U.K. 1778 tons. The balance was shared between Europe 3147 tons, British possessions 1343 tons and other countries 59 tons.

## TRAVANCORE RAYON PLANT

### *The First in India*

A RAYON plant, the first of its kind to be erected in India, has started production at Perambavoor in North Travancore, about 30 miles from Cochin harbour. It is run by Travancore Rayons, Ltd.

The factory has been promoted with the support and patronage of the Travancore-Cochin Government and is designed to produce five tons of artificial silk yarn per day. The artificial silk yarn industry is thought to have great potentialities for development in India as the yarn consumption in the country by handlooms exceeded 80 tons per day, costing over Rs.1 million. The entire quantity was now being imported.

The Travancore-Cochin Government recently carried out experiments for the preparation of wood pulp which revealed that bamboo, plentiful in the Travancore-Cochin forests was well suited for making the pulp. The Research Institute at Poona is now carrying out experiments in the preparation of pulp from other similar fibres to the bamboo fibre.

## Indian Sources of Sulphur

CONCERN about the absence of natural occurrences of sulphur in India was expressed at a recent meeting of the governing body of the Council of Scientific and Industrial Research of India, presided over by the Prime Minister, Pandit Nehru, in Delhi.

In view of the importance of sulphuric acid for industrial development, it was recommended that the Government of India should construct a pilot plant for the manufacture of sulphur from gypsum, of which adequate supplies are available.

The council also decided that the possibility of making use of copper pyrites and other similar sources of sulphur for the manufacture of sulphuric acid should be investigated.

### Alternative Source of Paper Pulp

Paper mulberry is credited with being a good source of raw material for the manufacture of newsprint in India, according to investigations conducted at the Indian Forest Research Institute at Dehra Dun. Newsprint made from this type of mechanical pulp at the instance of the Institute compares favourably with the imported newsprint and is said to be superior in colour and printing properties. Paper mulberry thrives well in the tropics.

# THE HEAVY WATER PILE

## *Concentrated Research at Chalk River Plant*

IN the search for fundamental information indicating how materials behave under intense bombardment, scientists at the Chalk River, Ontario, Atomic Energy Project have surrounded the heavy water pile with a mass of experimental equipment. Concentrated beams of neutrons emerging from the various apertures are guided into these assemblies, which are aligned like spokes of a wheel.

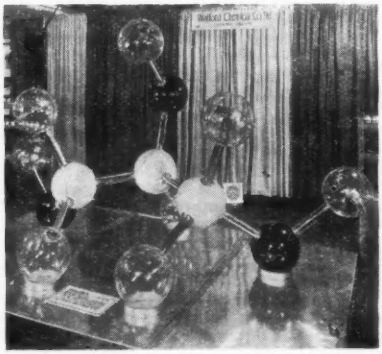
The instrument in the centre of the photograph is a neutron spectrometer, used to determine the structure of certain chemical compounds.

The assembly at the right of the photograph is a special type of electron-pair spectrometer by which energy levels in the nuclei of atoms are investigated. In a study of the structure of a particular nucleus, the high flux of neutrons from the pile is collimated into a narrow beam which is incident on some particular element, for example, aluminium. A neutron enters the nucleus of a particular aluminium atom and the consequent increase of energy (or excitation energy) produces radiations of definite short wavelengths. These gamma rays pass through an obstacle in a magnetic field which converts the ray into a pair of electrons, one positively and one

negatively charged; the magnetic field bends the path of both so that they travel round in opposite directions until they fall on two symmetrically placed detectors, where their incidence is recorded only if they arrive simultaneously. By adjusting the magnetic field—and knowing the dimensions of the apparatus and various other constants—it is possible to deduce energy levels in the nucleus of the aluminium atom.

## *British Share in the Chicago Exposition*

HALF-a-century of chemical progress was reflected in some of the exhibits at the sixth National Chemical Exposition held recently by the Chicago section of the American Chemical Society. This model,



exhibited by the Watford Chemical Co., Ltd., of London, to represent a molecule of glycerol magnified 6400 million times, was constructed mainly of plastics. Inside the "atoms" of hydrogen were shown some of the esters manufactured by the company, based on glycerol and other polyhydric alcohols.

Among the wide range of industrial chemical products shown by the firm were: synthetic caffein and theophylline for pharmaceuticals; a synthetic drying oil to replace tung oil, with good drying and film-forming properties; and a new range of oil additives for the petroleum industry.

### U.S. Domestic Copper Price

The price for U.S. domestic copper was established last week at a general level of 24½ cents per lb. This was finally concluded by the Kennecott Copper Company and Phelps Dodge Corporation raising their prices by 2 cents per lb. Other producers and smelters have been charging 24½ cents since last August.

DDT AND NEWER PERSISTENT INSECTICIDES—T. F. West and G. A. Campbell, 2nd Edition. Revised. 631 + xiv pp. Chapman and Hall, Ltd., 50s.

The first edition of this book was published in 1946, under the title "DDT, The Synthetic Insecticide;" it encompassed 301 pages, so that it was rather less than half as long as this edition. This consists in the main of a collection of abstracts of reports on work carried out with DDT; it contains vastly more information than did the first edition, but it has necessarily become much less "readable." Whereas in 1946 an exciting story of a new discovery was told enthusiastically, the romance is now hidden under a welter of scientific detail of varying quality. Immense trouble has been taken to collect reports of the widespread work carried out on DDT, but little attempt seems to have been made to sift the wheat from the chaff; the book would have been more valuable if the work it summarises had been critically reviewed. That is perhaps too much to expect; as it is Dr. West and Mr. Campbell have provided a standard reference book on DDT which will perform useful service to biochemists and entymologists throughout the world. The pattern of the book is the same as that of its predecessor, and the first 14 chapters are unchanged. The new chapters, on "Benzene Hexachloride;" "Chlordane;" "Toxaphene;" and "Various New Insecticides;" make up rather less than one-eighth of the book; DDT is still the major consideration.

Chlordane and Toxaphene are chlorinated hydrocarbons; their empirical, but not their structural, formulæ are given. Their discovery was a logical development of the discovery of DDT itself.

From the many hundreds of pests whose reaction to DDT is described by West and Campbell, of particular interest is the sheep blowfly, which inflicts incalculable suffering on flocks and severe monetary loss on sheep farmers. Early trials with dips containing ½ per cent DDT suggested that these gave less protection than the commercial arsenic/sulphur dip, but more recent work has shown that "two dippings may be said to have given complete protection from normal strike throughout the season." It would be agreeable if that were the final verdict, but another report states that although the adult blowflies are killed on contact, yet the larvæ of *Lucilia cuprina* (a blowfly) are unhurt by crawling in DDT itself. This is more or less typical of what one finds throughout the book. There appears to be no discussion of the important subject of the emergence of resistant or immune varieties of insects in the second or third year of DDT treatment; probably this is because very little of the work discussed in the text is later than 1946; to some extent this omission is remedied by the inclusion of a bibliography to the end of 1948. Such a time-lag pays tribute to the success of DDT; it has become so widely used, its literature so vast that no two people could hope to produce a review that was at once comprehensive and up to date.—R.W.M.

## *Books Received*

PRINCIPLES OF NUCLEAR CHEMISTRY. R. R. Williams. 1950, New York, London and Toronto: D. Van Nostrand Co., Inc. Pp. ix + 307. 28s. 6d.

THE IDENTIFICATION OF MOLECULAR SPECTRA. R. W. B. Pearse and A. G. Gaydon. Second edition revised. 1950. London: Chapman & Hall, Ltd. Pp. xi + 276. 50s.

THE TRANSURANIUM ELEMENTS: RESEARCH PAPERS. Edited by G. T. Seaborg, J. J. Katz and W. M. Manning. Two vols., National Nuclear Energy Series, 4-14 B. McGraw-Hill Book Co., Ltd.

### Radiochemistry at Sir John Cass College

A course of six lectures on radiochemistry and radiology has been arranged for the 1950-51 session of Sir John Cass College. The lectures, the first of which will be held on Tuesday, November 7, are to be given by Dr. A. G. Maddock, of the University of Cambridge radiochemical laboratory and Dr. J. F. Duncan, of the Atomic Energy Research Establishment, Harwell. The subject will be divided into six sections: Radioactivity, radioisotopes, radiochemistry, measurement of radiation, preparation of sources for radioactive counting and laboratory practice.

# Technical Publications

LIQUID heat engineering is one of the modern methods of heat transfer for which an increasing number of applications are being found. The liquid transfer system is not corrosive, toxic or explosive, offers no serious fire hazard when used in a pump-circulated flow and return pipe system. Chemical properties of one of the heat transfer fluids (tetra aryl silicate) and other particulars of the new transfer medium are given in a leaflet obtainable from Hygrotherm Engineering, Ltd., London.

* * *

ADDED to the many technical publications issued by The Mond Nickel Co., Ltd., is a new publication on aluminium alloy castings. This is based on the paper presented by Frank Hudson, F.I.M., to the congress of The American Foundrymen's Society in May of this year and deals with all aspects of castings in these alloys, including early developments, recent metallurgical practice and modern production methods. A tabulated summary of the many alloys available and a wealth of illustrations showing foundry technique, etc., make this publication valuable to engineers and designers in all industries.

* * *

PRACTICAL facts about some commercial grades of kieselguhr, with amusing notes by the way which also convey some useful information about this traditional filter aid, are contained in a brochure available from Chas. H. Windschuegl, Ltd., London.

* * *

CREEP-tested wrought alloys to meet exacting standard specifications are listed in a leaflet recently issued by Henry Wiggin & Co., Ltd., Birmingham. A recent addition to the series, Nimonic 90, containing a proportion of cobalt, has high load-carrying capacities for long periods at 875° to 870° C. Types of wrought alloys not supplied to creep test specification and alloys for remelting are also summarised.

* * *

FROM the discovery of the thermionic emission of the alkaline earth oxides was developed the modern oxide-coated cathode, widely used in the field of electronics. Conduction processes in the oxide-coated cathode are the subject of a paper by R. Loosjes and H. J. Vink in "Philips Technical Review" (Vol. II. No. 9), dealing with technical problems of the Philips' industries—in English, French, German and Dutch.

[By courtesy of Mathew Brothers

*Palletised 40-gal. drums of chemicals in pallets of five drums weighing approximately 2200 lb., being lifted during the Matbro truck demonstration*

A LOGICAL development of the fork-lift truck, to provide a machine with ample power and heavy tyres which cannot be incapacitated by heavy burdens or rough going, was recently demonstrated in Surrey by Mathew Brothers, Ltd., Wallington. The Matbro forklift truck is suitable for soft and pot-holed ground similar to that met with on open industrial sites and will, of course, operate equally well in normal factory conditions.

* * *

PRACTICAL considerations for insulation and the value of bricks based on diatomaceous earth in procuring heat control and economy are described in the Kimolo (Moler) Technical Handbook No. 1, issued by Cellactite and British Uralite, Ltd., London.

### Fish Tasted of Disinfectant

Allegations that fish from the Dee estuary now sometimes taste of disinfectant were contained in a letter cancelling orders from a local fisherman. The letter was read at the final meeting last week of the Dee & Clwyd Fishery Board, whose functions are now taken over by the new River Board. A fishery superintendent pointed out that taint in the local fish could have been derived from sources other than chemicals.

# · PERSONAL ·

THE Government-appointed Iron and Steel Corporation of Great Britain, the steel nationalisation authority, has appointed as secretary MR. S. S. WILSON, who, since 1948, has been an Under Secretary in the Ministry of Supply. Prior to that he occupied the equivalent rank in the Ministry of Transport. The Ministry of Supply has released Mr. Wilson in the interests of the new steel group.

SIR EDWARD MELLANBY, of the National Institute for Medical Research and secretary, from 1933-1944, of the Medical Research Council, is among a number of eminent scientists who have been invited to take up appointments in India. Sir Edward will leave England next month to take up his post as director and organiser of the Central Drug Research Institute. DR. ERNEST ZIPKES, of the Federal Institute of Technology, Zurich, Switzerland, has already assumed charge of the Central Road Research Institute in Delhi, while PROFESSOR CHARLES CRUSSARD, professor of physical metallurgy at the School of Mines, Paris, is also expected to arrive in India before the end of the year to become director of the National Metallurgical Laboratory.

DR. TEODOR CANBACK, chief of the pharmaceutical control laboratory of the Pharmaceutical Society of Sweden, was recently in London on his way to the U.S.A. He is to spend some months studying the working of the food and drugs administration there.

MR. J. L. SHARP, of Hawick, who has been appointed a Fellow of the Textile Institute, is assistant manager of the British Cotton and Wool Dyers' Association, Ltd., and is a joint patentee of improvements relating to the treatment of wool. He has undertaken research into the scouring of wool yarn and the dyeing of cotton with sulphur colours. Among the 34 associate members, newly elected in recognition of their success in the institute's examination in general textile technology, is MR. J. E. ROTHWELL, lecturer in textile chemistry at the Burnley Municipal College.

At the 11th annual general meeting of the British Valve Manufacturers' Association the chairman, MR. E. BRUCE BALL (Glenfield & Kennedy, Ltd.), and the vice-chairman, MR. J. M. STOREY (Dewrance & Co., Ltd.), were re-elected in their former capacities.

MR. H. TREFOR JONES, provincial soils chemist in the Yorkshire and Lancashire province of the National Agricultural Advisory Service, has been appointed deputy provincial director for the Yorkshire and Lancashire province in succession to MR. W. WEIR, who has retired.

## OBITUARY

The death is announced, at the age of 73, of MR. FREDERIC H. LEES, formerly chief analyst at the Wellcome Chemical Works, Dartford, of Burroughs Wellcome & Co. He retired in 1941 after more than 40 years' service.

The death has occurred of MR. THOMAS MARNS, a past president of the Pharmaceutical Society.

## Successful Chemical Engineers

A NOTEWORTHY feature of the 1950 associateship membership examination of the Institution of Chemical Engineers was the large entry from Holland. A new centre for the examination was therefore established at the University of Delft, through the good offices of Professor H. Waterman. Of the 118 candidates, the following 73 satisfied the examiners:—

George Atlass, Francis William Baker, Teunis Bakker, Stanley Brown, Alfred John Urbane Bull, Sydney Henry James Burgess, Kenneth George Burridge, Thomas Bartlett Buyers, Anthony Robert Clark, Colin Evelyn Clark, Harold William Cooper, William Cowling, Vernon Reginald Crane, Thomas Ian Marsh Crofts, John Edwin Cullingworth, Gerardus Wibertus de Vries, James Burnside Diamond, Russel Arthur Nicholas Dixson-Bordoll, Robert Tertius Douglas, John Willoughby Dryden, Frank Wallis Edwards, Johannes Eckels, James Henry Forster, John Frederick Spencer Frith, John Theodore Stephen Gundry, Peter George Range Haines, Alfred Donald Hewitt, John Edward Hickford, Henry Russell Hinchcliff, Jack Hofstra, James Richard Horth, Frank Edward Ireland, Jan Jacobi, Edward Charles Anthony James, David Keel Johnson, Charles David Eric Jones, Harry Jones, Waclaw Andrezej Koral, Robert Lindsay Ledger, Johannes Matinus Lintsen, Harry Brian Locke, Ian Ronald McDougall, George McKeand, Ian James Lachlan Macpherson, Victor Christopher Marshall, Charles George Martin, James Harold Mather, Douglas Harold Mellor, Eric Morgan, Kenneth Palmer, James Justin Parsons, James Galloway Thomas Paterson, John Wilfred Pease, Thomas Oliver Penman, Thomas Frederick Perkins, Royston Sidney Pottinger, Richard William Rudin, William Ernest, Russell, John James Settle, John Frederick Sewell, Duncan Shuttleworth, Claude Kenneth Smith, Frank Swire Smith, Leonard Percival Smith, Richard Peter Spalding, Robert Leslie Stephens, Saxon John Glenville Taylor, Douglas William Thrift, David Traill, Donald Hugh Trethewey ,Johannes Marimus van Brummelen, Gerrit van den Berg, Rodger Walker, Israel Wilenitz, Ronald Douglas Wilkinson, Reginald Edward John Williams, Albert Ernest James Yelland.

# HOME

### Refined Oil Prices Unchanged

There will be no change in the prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period ending December 2.

### BSI in Manchester

The British Standards Institution has opened a branch office at 12 Hilton Street, Manchester 1 (Central 4856, Telegrams: Bristandin, Manchester) of which Mr. A. F. B. Nall, assistant technical director of the Institution, is in charge.

### U.S. Microfilm Equipment to be Made Here

Manufacture of microfilm equipment in the U.K. has been arranged by an agreement between Mr. J. Arthur Rank and an American firm. The equipment will be put on the British market and will also be exported.

### Wider Use of Shrink Resisting Process

An agreement reached between the Board of Trade and the dyers and finishers which will come into force shortly will permit utility rayons, particularly spuns and crepes, to be made shrink resistant. At present, the process is used only for non-utility fabrics which are subject to purchase tax. The processing will involve an extra cost of between 3d. and 4d. per yard for those fabrics in which it is employed.

### Chemical Employment

Numbers employed in the chemical and allied trades in July remained steady, the total figure (in thousands) being 446.6 compared with 445.5 in June. Detailed distribution, as shown in the *Ministry of Labour Gazette*, was as follows: Coke-ovens and by-product works 17.2; chemicals and dyes, 204.4 (151.4 men, 53.0 women); pharmaceuticals, etc., 34.1 (13.9 men, 20.2 women); explosives, etc., 36.1; paint and varnish, 38.8; soaps, glycerin, etc., 49.1; mineral oil refining 36.2; oils, greases, glues, etc., 30.7.

### NCB Scholarship Awards

The National Coal Board has awarded 80 university scholarships, in mining engineering and allied subjects, to 49 miners and 31 schoolboys. This is the third successive year in which the Board has offered 100 scholarships, to be divided between men in the industry and boys who have taken their Higher School Certificate. Most of the awards are for students to read mining engineering, a few are for mechanical and electrical engineering.

### New Chrome Ore Price

The prices of chrome ore, Baluchistan metallurgical grade, are announced by the Ministry of Supply to be these: *ex* ship, £12 19s. 6d.; *ex* store, £13 17s. per ton delivered. The last quotation, on May 13, was (*ex* ship) £12 0s. 6d. per ton.

### Virgin Zinc Quotas

Restriction of the amounts of virgin zinc that can be acquired by consumers in the United Kingdom has become necessary owing to shortage of the metal. From October 1 until further notice consumers will be allowed to purchase from the Directorate of Non-Ferrous Metals not more than nine-tenths of their average monthly consumption in 1949.

### Tin Nears Price Record

The price of tin on the London Metal Exchange fell slightly on October 4, but hardened on the following day, strengthening on October 6 by a further £11 to settlement at £830. On October 9 the spot price rose £14 10s. to £843-£848 a ton, nearing the record established in August of £850. Settlement on the closing session was £845.

### Pure Benzene

Among the products of the Catarole process Petrochemicals, Ltd., is producing large quantities of very pure benzene and toluene. These compounds are of a purity approaching analytical reagent standard and have a narrow boiling range, a very low acid wash number and only slight variations in specific gravity. They are designed for use in processes which can only operate satisfactorily with very pure chemicals. Another of the company's products, Catarex benzene T.F., which contains not more than 2 p.p.m. of thiophene, is available on a commercial scale and is suitable for catalytic processes.

### Scottish Plant for the Colonies

Chemical engineering interests were well represented at the "Engineering for the Colonies," exhibition recently held in the Engineering Centre, Glasgow. Among the plant supplied to the 28 Colonial markets by Glasgow and West of Scotland firms were oil and sugar refining plant, machinery for handling molasses and distillation plant. Other equipment included rubber handling machinery and wine processing apparatus. Among the leading suppliers were Babcock and Wilcox, Ltd., Glenfield and Kennedy, Ltd., and Clyde Tube Forgings, Ltd.

# The Stock and Chemical Markets

STRONG buying of British Funds carried long-dated stocks to their highest levels this year—3½ per cent War Loan to 97⅛. This was attributed partly to foreign demand for sterling securities on the assumption that, although no immediate change is expected, an upward revaluation of sterling may be inevitable next year. Industrial shares generally, however, showed only moderate response to the big rise in gilt-edged stocks, partly because of fears of higher taxation and lower dividends in 1951. Commodity shares, particularly rubbers, on the other hand, were good. Rubber rose sharply to 4s. 1½d. per lb. earlier in the week, while tin has advanced to its highest figure since free dealings were resumed.

Chemical and allied shares were firmer in most cases. Imperial Chemical, after declining to 41s. 3d. recently following talk of more nationalisation plans to come, rallied sharply to 41s. 9d. Fisons eased to 26s. 3d., but were later 26s. 9d. Monsanto showed firmness at 51s. Albright & Wilson 5s. ordinary shares held steady at 30s., with the new 5 per cent preference at 1s. 9d. premium. Boake Roberts were 31s. 6d., Brotherton 20s. 3d., F. W. Berk 11s. and Laporte Chemicals 5s. units 10s. 7½d. Helped by good trading results, L. B. Holliday 4½ per cent preference were 20s. Amber Chemical 2s. shares held 2s. 9d., and Bowman Chemical 4s. shares were 5s. 3d. W. J. Bush were up to 85s. 6d. and the 5 per cent preference 22s. 9d.

There were very active dealings in the new Lever & Unilever 3¾ per cent debentures, which on the first day of dealings reached a premium of 28s. 9d. over the issue price. The company's ordinary units rose sharply to 44s. on market opinion that there may be a prospect of the Dutch Lever N.V. increasing its dividend which would mean more from the English company because of the dividend equalisation agreement between the two concerns. It is pointed out, however, that it is quite impossible to forecast financial results of a world-wide organisation such as this, particularly as profits may depend to a large extent upon commodity prices and whether the rising trend in costs can be checked.

British Celanese were again active up to 25s., pending the dividend announcement. There has been continued market talk of a forthcoming new issue of capital. The higher price for the metal strengthened British Aluminium slightly to 44s. 9d., and there was further activity up to 27s. in Triplex Glass shares, although British Oxygen lost a few pence at 93s. 9d. Turner & Newall at 83s. 9d. have been firm and, United Molasses were steady at 46s. and the 4s. units of the Distillers Co. active around 19s. 7½d.

Iron and steels were easier on the announcement that February 15 is to be the vesting date when steel shares are to be transferred into the new nationalisation steel stock. Steel shares remain well below their scheduled take-over prices, news of the vesting date having led to further selling by holders who do not wish to transfer into steel stock because of the big loss of income that will be involved. It is generally assumed in the market that steel stock will be a fairly long-dated 3½ per cent stock issued at par, but this will depend on the general level of gilt-edged prices next February.

Glaxo Laboratories eased to 50s. after an earlier further rise, Boots Drug at 49s. 6d. have been steady, but oils were uncertain, with Anglo-Iranian higher at £6⅞, although Canadian Eagle Oil eased to 26s. 6d. on the new issue.

## Market Reports

ACTIVE trading has continued throughout the industrial chemicals market and the demand from home users has been well maintained, both as regards delivery specifications and the placing of new business. A steady flow of overseas inquiry has been reported and bookings for shipment are believed to be well up to recent levels. A number of price changes, the result of the recent substantial rise in the price of molasses (THE CHEMICAL AGE, *63*, 495), have tended to diminish incidental dealings in some spirits and solvents. The quotation for lithopone is now £44 2s. 6d. for quantities of 1 ton and over. Business in the coal tar products market remains active and carbolic acid, creosote oil and cresylic acid are in strong request.

MANCHESTER.—A steady demand has been reported on the Manchester market during the past week for most lines of heavy chemical products. Home-trade inquiry from the principal industrial outlets has covered a wide range and replacement buying has been going forward satisfactorily. Shippers' inquiries relating to parcels for the Empire and other export

(*continued at foot of following page*)

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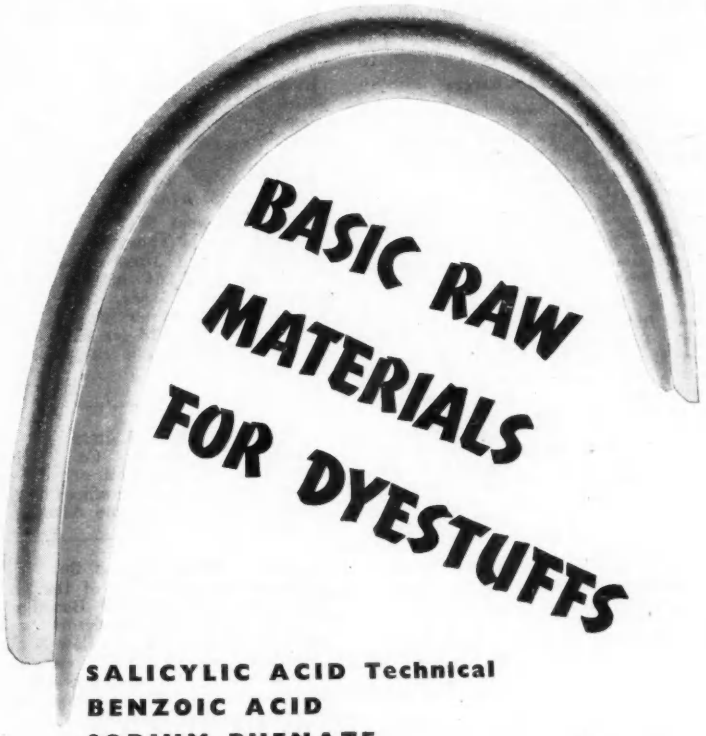


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# Law and Company News

## Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

### Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BAIRD & TATLOCK (LONDON), LTD., laboratory furnishers, etc. (M., 14/10/50.) September 6, debenture to Industrial & Commercial Finance Corporation, Ltd., charged on properties specified and a general charge (subject to etc.). *Bankers to limit of £200,000. April 19, 1950.

BENNETT (HYDE), LTD., (Ches.), manufacturers of rosin, etc. (M., 14/10/50). September 7, charge to Williams Deacon's Bank, Ltd., securing all moneys due or to become due to the bank; charged on land and works, Boston Mills, Hyde. *Nil. September 20, 1949.

C. E. UNDERHILL & SONS, LTD. (formerly C. E. UNDERHILL & CO., LTD.), Callington, chemists. (M., 14/10/50.) September 11, £2500 (not ex.) mortgage to Lloyds Bank, Ltd.; charged on bungalow, etc., known as the Glade Grove, Harrobarrow, Calstock. *Nil. March 7, 1949.

JOSEPH WELLS & SONS, LTD., Dartford, pyrotechnists. (M., 14/10/50.) September 11, mortgage to Midland Bank, Ltd., charged on Springate, Joyce Green Lane, Dartford, and fixtures. *Nil. October 1 1949.

### Satisfaction

CROYDON CHEMICAL CO., LTD., (formerly CHOCROLL, LTD.), Croydon.—(M.S., 14/10/50.) Satisfaction September 19, of debentures registered November 12, 1937, to the extent of £1000.

### Receivership

ALBION SOAP CO., LTD., 48 Gowers Walk, Commercial Road, E.1. (R., 14/10/50). Mr. Cyril Cantor, A.C.A., of Ling House, 10/13 Dominion Street, South Place, E.C.2, was appointed receiver and manager on September 5 under powers contained in debenture dated March 31, 1949.

## Company News

### Glaxo Laboratories, Ltd.

Group profits of Glaxo Laboratories, Ltd., for the year ended June 30, 1950, after providing for all charges and U.K. taxation, amounted to £1.239 million (£933,398). A final dividend of 12½ per cent on ordinary stock is recommended and £150,000 is to be placed to reserve for future research and development.

### Thomas W. Ward, Ltd.

The report of Thos. W. Ward, Ltd., for the year ended June 30, shows a total profit of £442,964 after providing for taxation and charges. A final ordinary dividend of 10 per cent is proposed, making a total of 15 per cent for the year. A sum of £558,726 is carried forward to the current year.

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### New Address

Audley Engineering Co., Ltd., valve manufacturers, of Newport, Shropshire, has changed its London offices to 2, Caxton Street, S.W.1; Telephone ABBEY 2041.

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### P. B. Cow & Co.

Since the publication of the announcement last week that the Board of Trade had appointed two inspectors to investigate the affairs of P. B. Cow & Co. (THE CHEMICAL AGE, *63*, 519) a statement has been issued by the directors stating that the present and future trading position of the company is satisfactory.

The notice received by the company from the Board of Trade specifically referred to the promotion of the company and the prospectuses dated August 13, 1947, and October 26, 1948.

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### THE STOCK AND CHEMICAL MARKETS

*(continued from previous page)*

outlets have been fairly numerous. Firm price conditions continue in most sections. A moderate aggregate weight of new business in fertilisers has been placed and there is a steady trade in both the light and heavy tar products.

GLASGOW.—The Scottish heavy chemical market has shown considerable renewed activity during the past week. Prices are firming daily. Export business continues steady with, unfortunately, in many instances a shortage of supplies.

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W28

# Next Week's Events

## MONDAY, OCTOBER 16

### Royal Institute of Chemistry

Dartford: The Bull Hotel, 7.30 p.m. Brig. J. S. K. Boyd: "Some Chemotherapeutic Problems in Tropical Diseases."

### Society of Chemical Industry

London: Chemistry Lecture Theatre, Royal College of Science, South Kensington. 2.30 p.m. "Iodinated Proteins and Thyroxine in Animal Husbandry" by Dr. K. L. Blaxter.

Leeds University: Chemistry Lecture Theatre. 7 p.m. Jubilee Memorial Lecture: "Solid and Catalytic Reactions" by Professor W. E. Garner, C.B.E., D.Sc., F.R.S.

## TUESDAY, OCTOBER 17

### Institute of Petroleum

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Joint meeting with the Society of the Manufacturers of Petroleum Equipment.

### Institution of Electronics

Manchester: Reynolds Hall, College of Technology, 6.30 p.m. A. E. Crawford (Mullard Electronics, Ltd.): "Ultrasonics."

### Textile Institute

Macclesfield: Memorial Hall, 7.45 p.m. Chairman: G. M. Swindells. Talk and film—"Air Conditioning."

### Society of Chemical Industry

Newcastle-upon-Tyne: "Potassium Deposits in North-East Yorkshire" by Dr. A. Fleck.

### Bradford Chemical Society

Bradford Technical College: 7 p.m. "The Chemical Structure of Wool" by Dr. S. Blackburn.

## WEDNESDAY, OCTOBER 18

### Royal Institute of Chemistry

London: Cora Hotel, Upper Woburn Place, W.C.1, 3.30 p.m. Symposium: The Chemist as: (a) An administrator—D. W. Hill; (b) A company director—W. D. Scott; (c) A technical salesman—R. S. Tarring; (d) An information officer—S. E. Fox.

### Institute of Fuel

London: Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, 5.30 p.m. The Melchett Lecture. Prof. R. J. Sarjant: "Ignipotence."

Manchester: Engineers' Club, Albert Square, 2 p.m. (with Institute of Petroleum). E. Bonwitt and H. E. Charlton: "The Fuel Heat and Power Aspects of the Petroleum Chemicals Plant for Petrochemicals, Ltd., Partington."

## THURSDAY, OCTOBER 19

### The Chemical Society

Manchester: The University, 6.30 p.m. (Joint meeting with RIC and SCI). Prof. R. D. Haworth: "The Chemistry of the Tropolones."

### Society of Chemical Industry

Belfast: Queen's University, 7.30 p.m. (Joint meeting of the Food Group with the Northern Ireland Section). Dr. J. B. M. Coppock: "The Application of Science in the Baking Industry."

### Institution of Structural Engineers

Manchester: Reynolds Hall, College of Technology, 7 p.m. A. V. Booth—chairman's address; sound film "Welded Structures."

### Institute of Metals

Sheffield: Grand Hotel, 6.30 p.m. E. Ayres and A. Hill: "Centrifugal Casting."

## FRIDAY, OCTOBER 20

### The Chemical Society

Aberdeen: Marischal College, 7.30 p.m. (Joint meeting with RIC and SCI). Dr. R. Hurst: "Recent Work on the Transuranic Elements."

Birmingham: The University, Edgbaston, 4.30 p.m. Dr. E. J. Bowen: "Chemistry and the Scattering of Light."

Plymouth: Technical College, 5 p.m. (Joint meeting with RIC and SCI). M. B. Donald: "The Basic Principles of Chemical Engineering."

St. Andrews: United College, 5 p.m. Prof. J. Read: "Historical Science as an Instrument of Culture."

### Oil & Colour Chemists' Association

Manchester: Midland Hotel. Reception 6.45-7.15 p.m. (Manchester Section). Silver Jubilee dinner and dance.

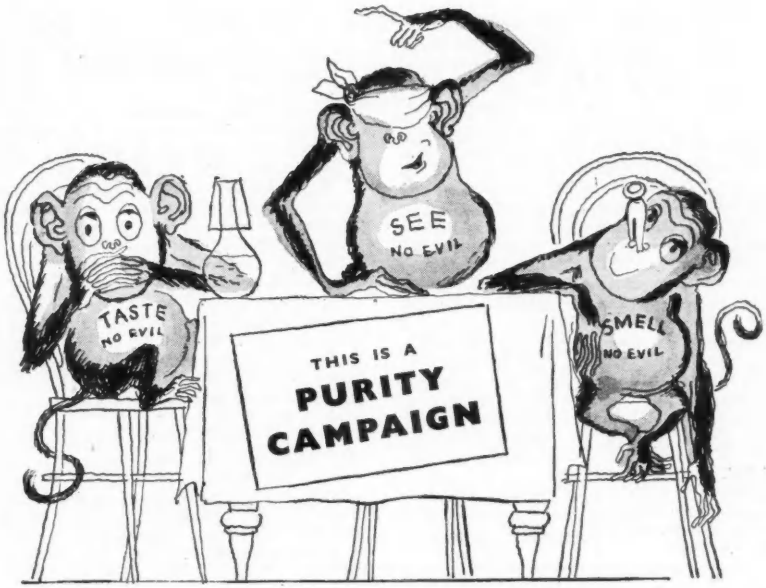
### Atomic Scientists' Association

London: Royal Institution, Albemarle Street, W.1. Two-day meeting with the Institute of Biology on the "Biological Hazards of Atomic Energy."

## SATURDAY, OCTOBER 21

### Society of Leather Trades' Chemists

Manchester: Engineers' Club, Albert Square, 2 p.m. Dr. Burton: "Vegetable Tanning"; W. L. Roberts: "A Repairer's Viewpoint on Leather."

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# Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

## Complete Specifications Accepted

Dyestuff preparations comprising leuco-sulphuric ester derivatives of vat dyestuffs.—Imperial Chemical Industries, Ltd., and A. Topham. Jan. 24 1949. 644,904.

Dyestuff preparations comprising leuco-sulphuric ester derivatives of vat dyestuffs.—Imperial Chemical Industries, Ltd., and A. Topham. Jan. 24 1949. 644,819.

Corrosion-preventing means for ferrous metal hot water tanks.—McGraw Electric Co. Feb. 17 1948. 644,825.

Siliceous dispersions.—D. A. W. Hill, C. Shaw and W. E. Langrish-Smith. Feb. 18 1949. 644,908.

Treatment of waste liquors containing iron sulphate.—Imperial Chemical Industries, Ltd., J. W. R. Rayner, J. H. Hudson and G. W. Ettle. Feb. 21 1949. 644,826.

Esters of mixtures of polyoxyalkylene monohydroxy compounds. — Carbide & Carbon Chemicals Corporation. Feb. 26 1948. 644,828.

Curing polymeric materials.—Imperial Chemical Industries, Ltd., D. H. Coffey, O. B. Edgar, T. J. Meyrick and J. T. Watts. March 7 1949. 644,829.

Distributors for granular and other loose material.—A. W. S. Pring. Feb. 10 1949. 644,710.

Manufacture of diaryl amines.—J. R. Howden (E. I. Du Pont De Nemours & Co.). March 19 1948. 644,938.

Process for the production of oxygen-containing organic compounds.—Naamlooze Vennootsschap De Bataafsche Petroleum Maatschappii. April 14 1948. 644,665.

Manufacture of calcium, barium and strontium.—Soc. Electro-Metallurgique Du Planet. April 20 1948. 644,941.

Production of aromatic carboxylic acids. —E. I. Du Pont De Nemours & Co., W. F. Gresham and C. E. Schweitzer. Feb. 22 1949. 644,667.

Apparatus for measuring humidity.—Foxboro Co. May 12 1948. 644,675.

Method of and apparatus for temporarily increasing the output of propulsive gases from a combustion chamber.—Naamlooze Vennootschap De Bataafsche Petroleum Maatschappij. May 14 1948. 644,719.

Polymers of monovinyl-phenoxthines.—British Thomson-Houston Co., Ltd. May 24 1948. 644,677, 644,678.

Preparation of 5-alkyl-5- (1', 2'-dibrom-2'-phenylethyl)-hydantoins.— Galactina & Biomalt Soc. Anon., and H. Kramer. June 9 1948. 644,722.

Method and means for the inertia separation of suspended matter from gases. —Directie Van De Staatsmijnen in Limburg. June 22 1948. 644,868.

Process for producing precious metals.—O. W. Haugen. July 6 1948. 644,954.

Rubber, latex or the like rings and process of making same.—Elastrator Co., Ltd. July 13 1948. 644,729.

Hardening treatment of casein or the like protein fibres.—Courtaulds, Ltd., L. E. Hodges and R. L. Wormell. July 20 1949. 644,958.

Uniting bodies by melted glass.—Sylvania Electric Products, Inc. Aug. 3 1948. 644,691.

Polishes and methods of preparing same. —E. R. B. Maunsell. Feb. 19 1949. 644,692.

Purification of selenium.—K. Krebs (H. Krebs). Aug. 24 1949. 644,743.

Alminium alloys.—H. C. Hall. Sept. 2 1949. 644,695.

Sensitive photographic emulsions.—J. H. Christensen. Oct. 4 1949. 644,970.

Apparatus for contacting gases or vapours with liquids.—Imperial Chemical Industries, Ltd., and G. J. Williamson. Sept. 21 1949. 644,976.

Means for the detection and quantitative determination of combustible gas or vapour in an atmosphere.—G. Malecki. April 23 1946. 645,252.

Isolation of anhydrous organic compounds from aqueous solutions thereof.—Merck & Co., Inc. May 1 1946. 645,253.

Decomposable substances such as vitamins and other food supplements.—R. P. Dunmire. Aug. 28 1946. 644,988.

Anti-friction elements of the graphite type for bushes, packings, joints, washers and the like and method for manufacturing same.—Soc. Le Carbone-Lorraine. Sept. 10 1946. 645,126.

Method and apparatus for electroplating.—Cleveland Graphite Bronze Co. October 10 1946. 645,183.

Production of solid depolarisation electrodes from active carbon for atmospheric oxygen elements.—Spolek Pro Chemickou a Hutni Vyrobu, Narodni Podnik. Oct. 31 1946. 644,990.

Resinous laminates and production thereof.—St. Regis Paper Co. Feb. 18 1947. 645,257.

Detergents.—California Research Corporation. April 16 1947. 645,129.

Processes of preparing thioxane derivatives and the compounds resulting therefrom.—Monsanto Chemical Co. May 9 1947. 645,130.

Method of making titanium-containing copper alloys.—Chapman Valve Manufacturing Co. June 12 1947. 645,003.

Base surfaces of articles, non-fibrous flexible films forming said base surfaces and pressure-sensitive adhesive tapes employing said base surfaces.—Minnesota Mining & Manufacturing Co. June 12 1947. 645,057.

Process and an apparatus for forming a filter on a filter body.—Dwars, G. June 12 645,260.

Immunization of hogs against hog cholera. American Cyanamid Co. June 17 1947. 645,058.

Rubberlike multipolymers containing a conjugated diene hydrocarbon.—B. F. Goodrich Co. July 22 1947. 645,263.

Methods of producing alpha-naphthoquinones and the alpha-naphthoquinones resulting therefrom.—Velsicol Corporation. July 23 1947. 645,061.

Sulphonation products of cashew nut shell liquid and the like.—Harvel Corporation. July 28 1947. 645,062.

Insecticidal compositions.—Harvel Corporation. July 31 1947. 645,132.

Inorganic oxide gels of spheroidal shape. Soconoy-Vacuum Oil Co., Inc. July 31 1947. 645,133.

Production of phosphoric esters.—Eastman Kodak Co. August 8 1947. 645,134.

Mineral oil composition.—Socony-Vacuum Oil Co., Inc. August 25 1947. 465,267.

Process for production of oxygenated sulphur compounds.—Standard Oil Co. August 28 1947. 645,268.

Method of growing crystals.—Patelhold Patentverwertungs- & Electro-Holding Akt.-Ges. Sept. 10 1947. 645,136.

Preparation of polymerisable pentachlorostyrene, its polymers and copolymers.—Mathieson Alkali Works. Sept, 22, 1947. 645,065.

Purification of aqueous solutions of sugar.—American Cynamid Co. Sept. 29 1947. 645,192.

Manufacture of textile treatment agents.—Imperial Chemical Industries, Ltd., W. Baird, T. Barr, E. S. Lane, and A. Lowe. Oct. 6 1948. 645,138.

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# CLASSIFIED ADVERTISEMENTS

## EDUCATIONAL

**THE INSTITUTION of CHEMICAL ENGINEERS**

**EXAMINATION, 1951**

Application forms, (returnable 1st December, 1950) and particulars of the Associate-Membership Examination for 1951 may be obtained from the Hon. Registrar, **INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, WESTMINSTER, LONDON, S.W.1.**

## SITUATIONS VACANT

**CHIEF RESEARCH CHEMIST.** Heavy organic chemical manufacturing company need a Chief Research Chemist to take charge of expanding research department. Appropriate experience is essential and the salary will be £1,500 or over according to applicants ability and qualities. A suitable house will be made available if necessary. Reply to Box No. C.A. 2954, THE CHEMICAL AGE, 154, Fleet Street, E.C.4.

THE Civil Service Commissioners invite applications for permanent appointments as **ASSISTANT EXPERIMENTAL OFFICER** to be filled by competitive interview.

The posts are in various Government Departments and divided between following main groups and subjects (a) Mathematical and Physical Sciences, (b) Chemistry and Metallurgy, (c) Engineering Subjects and (d) Miscellaneous (including e.g. Library and Technical Information Services). No further applications can be accepted from Biologists, Geologists or Meteorologists.

Interviews will be held throughout the remainder of the year, but a closing date for the receipt of applications earlier than December, 1950, may eventually be announced either for the competition as a whole or in one or more subjects.

Candidates must be at least 17½ years and under 26 years of age (or under 31 for established Civil Servants of the Assistant (Scientific) Class) on 1st August, 1950; time spent on a regular engagement in H.M. Forces may be deducted from actual age. Candidates must have obtained the Higher School Certificate with mathematics or a science subject as a principal subject, or an equivalent qualification; but candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Higher qualifications will be regarded as an advantage to candidates over the age of 20.

The inclusive London salary scale (men) is £230-£490. Salaries for women and for posts in the provinces are somewhat lower. Superannuation provision is made under the Superannuation Act.

Further particulars and forms of application from the **Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1. quoting No. 3068 8386/100/MB.**

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No. 211 One **HORIZONTAL MIXER** as above.

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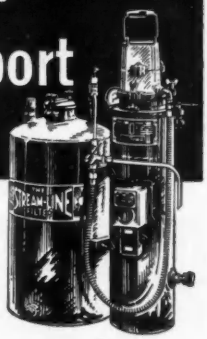


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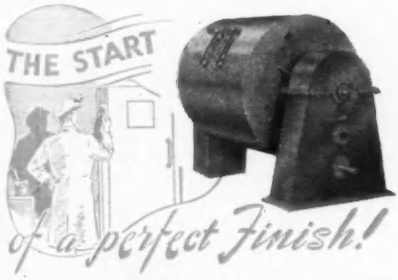


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